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WONDERS AND CURIOSITIES

FOUND IN
NATURE AND ART, SCIENCE AND LITERATURE.

NEW AND REVISED EDITION,

By I. PLATT, D. D.,

WITH NUMEROUS ILLUSTRATIONS.

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INTRODUCTION

It was well observed by Lord Bacon, that "It would much conduce to the magnanimity and honour of man, if a collection were made of the extraordinaries of human nature, principally out of the reports of history; that is, what is the last and highest pitch to which man's nature, of itself, hath ever reached, in all the perfection of mind and body. If the wonders of human nature, and virtues as well of mind as of body, were collected into a volume, they might serve as a calendar of human triumphs."

The present work not only embraces the Curiosities of human nature, but of Nature and Art in general, as well as Science and Literature. Surrounded with wonders, and lost in admiration, the inquisitive mind of man is ever anxious to know the hidden springs that put these wonders in motion; he eagerly inquires for some one to take him by the hand and explain to him the curiosities of the universe. And though the works of nature are great, and past finding out, and we cannot arrive at the perfection of science, nor discover the secret impulses which nature obeys, yet can we by reading, study, and investigation dissipate much of the darkness in which we are enveloped, and dive far beyond the surface of this multifarious scene of things. The noblest employment of the human understanding is to contemplate the works of the great Creator of the boundless universe, and to trace the marks of infinite wisdom, power, and goodness throughout the whole.

A considerable portion of the following pages is devoted to Curiosities in the works of Nature. It also presents to the reader a view of the great achievements of the human intellect in the discoveries of science, and the wonderful operations of the skill, power, and industry of man in the invention and improvement of the arts, in the construction of machines, and in the buildings and other ornaments the earth exhibits, as trophies to the glory of the human race.

The work is divided into ninety-one chapters. The Curiosities respecting Man occupy eleven chapters. The next four chapters are devoted to Animals; then two to Fishes; one to Serpents

and Worms; three to Birds; eleven to Insects; six to Vegetables; three to Mountains; two to Grottoes, Caves, etc.; one to Mines; two to the Sea; one to Lakes, Whirlpools, etc.; one to Burning Springs; one to Earthquakes; one to Remarkable Winds; one to Showers, Storms, etc.; one to Ice; one to Ruins; four to Buildings, Temples, and other Monuments of Antiquity; and one to Basaltic and Rocky Curiosities. The fifty-eighth chapter is devoted to the Ark of Noah, the Galley of Hiero, and the Bridge of Xerxes. The next six chapters detail at length the various Customs of Mankind in different parts of the World, and also explain many Old Adages and Sayings. The next five chapters exhibit a variety of curious phenomena in nature, such as the Ignis Fatuus, Thunder and Lightning, Fire Balls, Water Spouts, Fairy Rings, Spots in the Sun, Volcanoes in the Moon, Eclipses, Shooting Stars, Aurora Borealis or Northern Lights, etc., etc. The seventieth chapter is on Galvanism. The seventy-first on Magnetism. The next three chapters delineate the principal Curiosities respecting the Arts. Then follow five chapters on some of the principal Curiosities in History; three on the Curiosities of Literature; and nine on Miscellaneous Curiosities.

Truthful descriptions are given of the finest Buildings, the most remarkable Ruins; of the most extensive Libraries; of Animals, their propagation, nature and habits; of Wonderful Automaton and strange Machines; of Icebergs and Hot Springs; of huge Mountains and deep Caverns; of Bees and Birds; of the Ant and the Beaver; of Mines, Mining, Currency, and Coins; of Diseases and Cures; of Mesmerism and Galvanism; of Feasts and Famines; of Female Beauty, how to promote and how to injure it; of splendid Palaces and gorgeous Temples; of Scientific Investigations and priceless Discoveries; of Music and Musical Instruments; of Microscopic and Telescopic Wonders; of Human Perfections and Monstrosities; of Lightning, Thunder, Tornadoes, Cyclones; of Virulent Poisons and their Antidotes; and of the other wonders of Air, Earth, Fire, and Water.

An Appendix is added, containing a number of easy, innocent, amusing Experiments and Recreations.

The Compiler trusts the work will afford both entertainment and instruction for the leisure hour of the Philosopher or the Laborer, the Gentleman or the Mechanic. In short, all classes may find in the present work something conducive to their pleasure and improvement, as it will afford a constant source of subjects for interesting and agreeable conversation.

THE
BOOK OF WONDERS AND CURIOSITIES.

CHAP. I.

CURIOSITIES RESPECTING MAN.

The Human Body—the Countenance—the Eye—the Ear—the Heart—the Circulation of the Blood—Respiration—the Hair of the Head—the Beard—Women with Beards—Sneezing.

“ Come, gentle reader, leave all meaner things
To low ambition, and the pride of kings.
Let us, since life can little more supply
Than just to look about us, and to die;
Expatiate free o’er all this scene of Man,
A mighty maze! but not without a plan.
A wild, where weeds and flow’rs promiscuous shoot;
Or garden, tempting with forbidden fruit.
Together let us beat this ample field,
Try what the open, what the covert yield;
The latent tracts, the giddy heights, explore,
Of all who blindly creep, or sightless soar:
Eye nature’s walks, shoot folly as it flies,
And catch the manners living as they rise;
Laugh where we must, be candid where we can,
But vindicate the ways of God to man.”

WE shall, in the first place, enter on the consideration of
THE CURIOSITIES OF THE HUMAN BODY.—The following
account is abridged from the works of the late Drs. Hunter
and Paley.

Dr. Hunter shows that all the parts of the human frame are
requisite to the wants and well-being of such a creature as
man. He observes, that, first the mind, the thinking imma-
terial agent, must be provided with a place of immediate resi-
dence, which shall have all the requisites for the union of
spirit and body; accordingly, she is provided with the *brain*,
where she dwells as governor and superintendant of the whole
fabric.

In the next place, as she is to hold a correspondence with
all the material beings around her, she must be supplied with
organs fitted to receive the different kinds of impression which

they will make. In fact, therefore, we see that she is provided with the *organs of sense*, as we call them: the eye is adapted to light; the ear to sound; the nose to smell; the mouth to taste; and the skin to touch.

Further, she must be furnished with *organs of communication* between herself in the brain, and those organs of sense; to give her information of all the impressions that are made upon them; and she must have organs between herself in the brain, and every other part of the body, fitted to convey her commands and influence over the whole. For these purposes the *nerves* are actually given. They are soft white chords which rise from the brain, the immediate residence of the mind, and disperse themselves in branches through all parts of the body. They convey all the different kinds of sensations to the mind in the brain; and likewise carry out from thence all her commands to the other parts of the body. They are intended to be occasional monitors against all such impressions as might endanger the well-being of the whole, or of any particular part; which vindicates the Creator of all things, in having actually subjected us to those many disagreeable and painful sensations which we are exposed to from a thousand accidents in life.

Moreover, the mind, in this corporeal system, must be endowed with the power of moving from place to place; that she may have intercourse with a variety of objects; that she may fly from such as are disagreeable, dangerous, or hurtful; and pursue such as are pleasant and useful to her. And accordingly she is furnished with limbs, with *muscles* and *tendons*, the instruments of motion, which are found in every part of the fabric where motion is necessary.

But to support, to give firmness and shape to the fabric; to keep the softer parts in their proper places; to give fixed points for, and the proper directions to its motions, as well as to protect some of the more important and tender organs from external injuries, there must be some firm *prop-work* interwoven through the whole. And in fact, for such purposes the *bones* are given.

The prop-work is not made with one rigid fabric, for that would prevent motion. Therefore there are a number of bones.

These pieces must all be firmly bound together, to prevent their dislocation. And this end is perfectly well answered by the *ligaments*.

The extremities of these bony pieces, where they move and rub upon one another, must have smooth and slippery surfaces for easy motion. This is most happily provided for, by the *cartilages* and *mucus* of the joints.

The interstices of all these parts must be filled up with some soft and ductile matter, which shall keep them in their

places, unite them, and at the same time allow them to move a little upon one another; these purposes are answered by the *cellular membrane*, or edipose substance.

There must be an outward covering over the whole apparatus, both to give it compactness, and to defend it from a thousand injuries; which, in fact, are the very purposes of the *skin* and other integuments.

Say, what the various bones so wisely wrought?
 How was their frame to such perfection brought?
 What did their figures for their uses fit,
 Their numbers fix, and joints adapted knit;
 And made them all in that just order stand,
 Which motion, strength, and ornament, demand?

Blackmore.

Lastly, the mind being formed for society and intercourse with beings of her own kind, she must be endued with powers of expressing and communicating her thoughts by some visible marks or signs, which shall be both easy to herself, and admit of great variety. And accordingly she is provided with the *organs* and faculty of *speech*, by which she can throw out signs with amazing facility, and vary them without end.

Thus we have built up an animal body, which would seem to be pretty complete; but as it is the nature of matter to be altered and worked upon by matter, so in a very little time such a living creature must be destroyed, if there is no provision for repairing the injuries which she must commit upon herself, and those which she must be exposed to from without. Therefore a treasure of blood is actually provided in the heart and vascular system, full of nutritious and healing particles; fluid enough to penetrate into the minutest parts of the animal; impelled by the heart, and conveyed by the arteries, it washes every part, builds up what was broken down, and sweeps away the old and useless materials. Hence we see the necessity or advantage of the *heart* and *arterial system*.

What more there was of the blood than enough to repair the present damages of the machine, must not be lost, but should be returned again to the heart; and for this purpose the *venous* system is provided. These requisites in the animal explain the circulation of the blood, *a priori*.*

All this provision, however, would not be sufficient; for the store of blood would soon be consumed, and the fabric would break down, if there was not a provision made by fresh supplies. These we observe, in fact, are profusely scattered round her in the animal and vegetable kingdoms; and she is furnished with hands, the fittest instruments that could be contrived for gathering them, and for preparing them in their varieties for the mouth.

* This subject will be more fully explained hereafter.

But these supplies, which we call food, must be considerably changed; they must be converted into blood. Therefore she is provided with teeth for cutting and bruising the food, and with a stomach for melting it down; in short, with all the organs subservient to digestion: the finer parts of the aliments only can be useful in the constitution; these must be taken up and conveyed into the blood, and the dregs must be thrown off. With this view, the intestinal canal is provided. it separates the nutritious parts, which we call chyle, to be conveyed into the blood by the system of the absorbent vessels; and the coarser parts pass downwards to be ejected.

We have now got our animal not only furnished with what is wanting for immediate existence, but also with powers of protracting that existence to an indefinite length of time. But its duration, we may presume, must necessarily be limited; for as it is nourished, grows, and is raised up to its full strength and utmost perfection; so it must in time, in common with all material beings, begin to decay, and then hurry on into final ruin.

Thus we see, by the imperfect survey which human reason is able to take of this subject, that the animal man must necessarily be complex in his corporeal system, and in its operations.

He must have one great and general system, the vascular, branching through the whole circulation: another, the nervous, with its appendages—the organs of sense, for every kind of feeling: and a third, for the union and connection of all these parts.

Besides these primary and general systems, he requires others, which may be more local or confined: one, for strength, support, and protection,—the bony compages: another, for the requisite motions of the parts among themselves, as well as for moving from place to place,—the muscular system: another to prepare nourishment for the daily recruit of the body,—the digestive organs.

Dr. Paley observes, that, of all the different systems in the human body, the use and necessity are not more apparent, than the wisdom and contrivance which have been exerted, in putting them all into the most compact and convenient form: in disposing them so, that they shall mutually receive from, and give helps to one another: and that all, or many of the parts, shall not only answer their principal end or purpose, but operate successfully and usefully in a variety of secondary ways. If we consider the whole animal machine in this light, and compare it with any machine in which human art has exerted its utmost, we shall be convinced, beyond the possibility of doubt, that there are intelligence and power far surpassing what humanity can boast of.

One superiority in the natural machine is peculiarly striking. - In machines of human contrivance or art, there is no internal power, no principle in the machine itself, by which it can alter and accommodate itself to injury which it may suffer, or make up any injury which admits of repair. But in the natural machine, the animal body, this is most wonderfully provided for, by internal powers in the machine itself; many of which are not more certain and obvious in their effects, than they are above all human comprehension as to the manner and means of their operation. Thus, a wound heals up of itself; a broken bone is made firm again by a callus; a dead part is separated and thrown off; noxious juices are driven out by some of the emunctories; a redundancy is removed by some spontaneous bleeding; a bleeding naturally stops of itself; and the loss is in a measure compensated, by a contracting power in the vascular system, which accommodates the capacity of the vessels to the quantity contained. The stomach gives intimation when the supplies have been expended; represents, with great exactness, the quantity and quality, of what is wanted in the present state of the machine; and in proportion as she meets with neglect, rises in her demand, urges her petition in a louder tone, and with more forcible arguments. For its protection, an animal body resists heat and cold in a very wonderful manner, and preserves an equal temperature in a burning and in a freezing atmosphere.

A farther excellence or superiority in the natural machine, if possible, still more astonishing, more beyond all human comprehension, than what we have been speaking of, is the distinction of sexes, and the effects of their united powers. Besides those internal powers of self-preservation in each individual, when two of them, of different sexes, unite, they are endued with powers of producing other animals or machines like themselves, which again are possessed of the same powers of producing others, and so of multiplying the species without end. These are powers which mock all human invention or imitation. They are characteristics of the *Divine Architect*.—Thus far Paley.

Galen takes notice, that there are in the human body above 600 muscles, in each of which there are, at least, 10 several intentions, or due qualifications, to be observed; so that, about the muscles alone, no less than 6000 ends and aims are to be attended to! The bones are reckoned to be 284; and the distinct scopes or intentions of these are above 40—in all about 12,000! and thus it is, in some proportion, with all the other parts, the *skin, ligaments, vessels, and humours*; but more especially with the several vessels, which do, in regard to their great variety, and multitude of their several intentions, very much exceed the homogeneous parts.

How august,
 How complicate, how wonderful, is man !
 How passing wonder He who made him such !—
 From different natures marvellously mixt ;—
 Though *sully'd* and *dishonour'd*, still DIVINE !

Young

“ Come ! all ye nations ! bless the LORD,
 To him your grateful homage pay :
 Your voices raise with one accord,
 JEHOVAH’S praises to display.
 From clay our complex frames he moulds,
 And succours us in time of need :
 Like sheep when wandering from their folds,
 He calls us back, and does us feed.
 Then thro’ the world let’s shout his praise,
 Ten thousand million tongues should join,
 To heav’n their thankful incense raise,
 And sound their MAKER’S love divine.
 When rolling years have ceas’d their rounds,
 Yet shall his goodness onward tend ;
 For his great mercy has no bounds,
 His truth and love shall never end !”

So curious is the texture or form of the human body in every part, and withal so “fearfully and wonderfully made,” that even atheists, after having carefully surveyed the frame of it, and viewed the fitness and usefulness of its various parts, and their several intentions, have been struck with wonder, and their souls kindled into devotion towards the all-wise Maker of such a beautiful frame. And so convinced was Galen of the excellency of this piece of divine workmanship, that he is said to have allowed Epicurus a hundred years to find out a more commodious shape, situation, or texture, for any one part of the human body ! Indeed, no understanding can be so low and mean, no heart so stupid and insensible, as not plainly to see, that nothing but Infinite Wisdom could, in so wonderful a manner, have fashioned the body of man, and inspired into it a being of superior faculties, whereby He teacheth us more than the beasts of the field, and maketh us wiser than the fowls of the heaven.

Thrice happy men,
 And sons of men, whom God hath thus advanc’d ;
 Created in his image, here to dwell,
 And worship him ; and, in return, to rule
 O’er all his works.

Milton.

We now proceed to consider THE CURIOSITIES OF THE HUMAN COUNTENANCE.—On this subject we shall derive considerable assistance from the same German philosopher that was quoted in the last section. Indeed, we shall make a liberal use of Sturm’s Reflections in our delineations of the Curiosities of the human frame.



MUSCLES OF THE HUMAN BODY.—PROFILE VIEW.



MUSCLES OF THE HUMAN BODY.—BACK VIEW.

The exterior of the human body at once declares the superiority of man over all living creatures. His *Face*, directed towards the heavens, prepares us to expect that dignified expression which is so legibly inscribed upon his features; and from the countenance of man we may judge of his important destination, and high prerogatives. When the soul rests in undisturbed tranquillity, the features of the face are calm and composed; but when agitated by emotions, and tossed by contending passions, the countenance becomes a living picture, in which every sensation is depicted with equal force and delicacy. Each affection of the mind has its particular impression, and every change of countenance denotes some secret emotion of the heart. The *Eye* may, in particular, be regarded as the immediate organ of the soul; as a mirror, in which the wildest passions and the softest affections are reflected without disguise. Hence it may be called with propriety, the true interpreter of the soul, and organ of the understanding. The colour and motions of the eye contribute much to mark the character of the countenance. The human eyes are, in proportion, nearer to one another than those of any other living creatures; the space between the eyes of most of them being so great, as to prevent their seeing an object with both their eyes at the same time, unless it is placed at a great distance. Next to the eyes, the eye-brows tend to fix the character of the countenance. Their colour renders them particularly striking; they form the shade of the picture, which thus acquires greater force of colouring. The eye-lashes, when long and thick, give beauty and additional charms to the eye. They, at the same time, act as delicate curtains to catch any flying particles with which the atmosphere may be charged. The eye-brows are elevated, depressed, and contracted, by means of the muscles upon the forehead, which forms a very considerable part of the face, and adds much to its beauty when well formed: it should neither project much, nor be quite flat; neither very large, nor small; beautiful hair adds much to its appearance. The *Nose* is the most prominent, and least moveable part of the face; hence it adds more to the beauty than the expression of the countenance. The *Mouth* and *Lips* are, on the contrary, extremely susceptible of changes; and, if the eyes express the passions of the soul, the mouth seems more peculiarly to correspond with the emotions of the heart. The rosy bloom of the lips, and the ivory white of the teeth, complete the charms of the human face divine.

Another Curiosity on this subject is, the wonderful diversity of traits in the human countenance. It is an evident proof of the admirable wisdom of God, that though the bodies of men are so similar to each other in their essential parts,

there is yet such a diversity in their exterior, that they can be readily distinguished without the liability of error. Amongst the many millions of men existing in the universe, there are no two that are perfectly similar to each other. Each one has some peculiarity portrayed in his countenance, or remarkable in his speech; and this diversity of countenance is the more singular, because the parts which compose it are very few, and in each person are disposed according to the same plan. If all things had been produced by blind chance, the countenances of men might have resembled one another as nearly as balls cast in the same mould, or drops of water out of the same bucket: but as that is not the case, we must admire the infinite wisdom of the Creator, which, in thus diversifying the traits of the human countenance, has manifestly had in view the happiness of men; for if they resembled each other perfectly, they could not be distinguished from one another, to the utter confusion and detriment of society. We should never be certain of life, nor of the peaceable possession of our property; thieves and robbers would run little risk of detection, for they could neither be distinguished by the traits of their countenance, nor the sound of their voice. Adultery, and every crime that stains humanity, might be practised with impunity, since the guilty would rarely be discovered; and we should be continually exposed to the machinations of the villain, and the malignity of the coward: we could not shelter ourselves from the confusion of the mistake, nor from the treachery and fraud of the deceitful; all the efforts of justice would be useless, and commerce would be the prey of error and uncertainty: in short, the uniformity and perfect similarity of faces would deprive society of its most endearing charms, and destroy the pleasure and sweet gratification of individual friendship.

We may well exclaim with a celebrated writer,—

“What a piece of work is man! how noble in reason! how infinite in faculties! in form, and moving, how express and admirable! in action, how like an angel! in apprehension, how like a god!”

The next subject is, *THE CURIOUS FORMATION OF THE EYE*.—The *Eye* infinitely surpasses all the works of man's industry. Its structure is one of the most wonderful things the human understanding can become acquainted with; the most skilful artist cannot devise any machine of this kind which is not infinitely inferior to the eye; whatever ability, industry, and attention he may devote to it, he will not be able to produce a work that does not abound with the imperfections incident to the works of men. It is true, we cannot perfectly become acquainted with all the art the Divine Wis-

dom has displayed in the structure of this beautiful organ; but the little that we know suffices to convince us of the admirable intelligence, goodness, and power of the Creator. In the first place, how fine is the disposition of the exterior parts of the eye, how admirably it is defended! Placed in durable orbits of bone, at a certain depth in the skull, they cannot easily suffer any injury; the over-arching eye-brows contribute much to the beauty and preservation of this exquisite organ; and the eye-lids more immediately shelter it from the glare of light, and other things which might be prejudicial; inserted in these are the eye-lashes, which also much contribute to the above effect, and also prevent small particles of dust, and other substances, striking against the eye.* The internal structure is still more admirable. The globe of the eye is composed of tunics, humours, muscles, and vessels, the coats are the cornea, or exterior membrane, which is transparent anteriorly, and opaque posteriorly; the choroid, which is extremely vascular; the uvea, with the iris, which being of various colours, gives the appearance of differently coloured eyes; and being perforated, with the power of contraction and dilatation, forms the pupil; and, lastly, the retina, being a fine expansion of the optic nerve, upon it the impressions of objects are made. The humours are the aqueous, lying in the forepart of the globe, immediately under the cornea; it is thin, liquid, and transparent; the crystalline, which lies next to the aqueous, behind the uvea, opposite to the pupil, it is the least of the humours, of great solidity, and on both sides convex; the vitreous, resembling the white of an egg, fills all the hind part of the cavity of the globe, and gives the spherical figure to the eye. The muscles of the eye are six, and by the excellence of their arrangement it is enabled to move in all directions. Vision is performed by the rays of light falling on the pellucid and convex cornea of the eye, by the density and convexity of which they are united into a focus, which passes the aqueous humours, and pupil of the eye, to be more condensed by the crystalline lens. The rays of light thus concentrated, penetrate the vitreous humour, and stimulate the retina upon which the images of objects, painted in an inverse direction, are represented to the mind through the medium of the optic nerves.

* Besides these, amongst the internal parts are enumerated,—the lachrymal gland, which secretes the tears; the lachrymal caruncle, a small fleshy substance at the inner angle of the eye; the puncta lachrymalia, two small openings on the nasal extremity of each eye-lash; the lachrymal duct, formed by the union of the ducts leading from the puncta lachrymalia, and conveying the tears into the nose; the lachrymal sac, a dilatation of the lachrymal canal.

The visual orbs

Remark, how aptly station'd for their task;
 Rais'd to th' imperial head's high citadel,
 A wide extended prospect to command.
 See the arch'd outworks of impending lids,
 With hairs, as palisadoes fenc'd around
 To ward annoyance from without.

Bally.

Again:—

Who form'd the curious organ of the eye,
 And cloth'd it with its various tunicles,
 Of texture exquisite; with crystal juice
 Supply'd it, to transmit the rays of light;
 Then plac'd it in its station eminent,
 Well fenc'd and guarded, as a centinel
 To watch abroad, and needful caution give?

Needler.

The next subject is, THE CURIOUS STRUCTURE OF THE
 EAR.

The channel'd ear, with many a winding maze,
 How artfully perplex'd, to catch the sound.
 And from her repercussive caves augment!

Bally.

Dark night, that from the eye his function takes,
 The ear more quick of apprehension makes;
 Wherein it doth impair the seeing sense,
 It pays the HEARING—double recompense.

Shakspeare.

Although the ear, with regard to beauty, yields to the eye, its conformation is not less perfect, nor less worthy of the Creator. The position of the ear bespeaks much wisdom; for it is placed in the most convenient part of the body, near to the brain, the common seat of all the senses. The exterior form of the ear merits considerable attention; its substance is between the flexible softness of flesh, and the firmness of bone, which prevents the inconvenience that must arise from its being either entirely muscular or wholly formed of solid bone. It is therefore cartilaginous, possessing firmness, folds, and smoothness, so adapted as to reflect sound; for the chief use of the external part is to collect the vibrations of the air, and transmit them to the orifice of the ear. The internal structure of this organ is still more remarkable. Within the cavity of the ear is an opening, called the meatus auditorius, or auditory canal, the entrance to which is defended by small hairs, which prevent insects and small particles of extraneous matter penetrating into it; for which purpose there is also secreted a bitter ceruminous matter, called ear-wax. The auditory canal is terminated obliquely by a membrane, generally known by the name of drum, which instrument it in some degree resembles; for within the cavity of the auditory canal is a kind of bony ring, over which the membrana tympani is stretched. In contact with this membrane, on the inner side is a small bone (malleus) against which it strikes

when agitated by the vibrations of sound. Connected with these are two small muscles: one, by stretching the membrane, adapts it to be more easily acted upon by soft and low sounds; the other, by relaxing, prepares it for those which are very loud. Besides the malleus, there are some other very small and remarkable bones, called incus, or the anvil, as orbiculare, or orbicular bone, and the stapes, or stirrup: their use is, to assist in conveying the sounds received upon the membrana tympani. Behind the cavity of the drum, is an opening, called the Eustachian tube, which begins at the back part of the mouth with an orifice, which diminishes in size as the tube passes towards the ear, where it becomes bony; by this means, sounds may be conveyed to the ear through the mouth, and it facilitates the vibrations of the membrane by the admission of air. We may next observe the cochlea, which somewhat resembles the shell of a snail, whence its name; its cavity winds in a spiral direction, and is divided into two by a thin spiral lamina: and lastly is the auditory nerve, which terminates in the brain. The faculty of hearing is worthy of the utmost admiration and attention: by putting in motion a very small portion of air, without even being conscious of its moving, we have the power of communicating to each other our thoughts, desires, and conceptions. But to render the action of air in the propagation of sound more intelligible, we must recollect that the air is not a solid, but a fluid body. Throw a stone into a smooth stream of water, and there will take place undulations, which will be extended more or less according to the degree of force with which the stone was impelled. Conceive then, that when a word is uttered in the air, a similar effect takes place in that element, as is produced by the stone in the water. During the action of speaking, the air is expelled from the mouth with more or less force; this communicates to the external air which it meets, an undulatory motion; and these undulations of the air entering the cavity of the ear, the external parts of which are peculiarly adapted to receive them, strike upon the membrane, or drum, by which means it is shaken, and receives a trembling motion: the vibration is communicated to the malleus, the bone immediately in contact with the membrane, and from it to the other bones; the last of which, the stapes or stirrup, adhering to the fenestra ovalis, or oval orifice, causes it to vibrate; the trembling of which is communicated to a portion of water contained in the cavity called the vestibulum, and in the semicircular canals, causing a gentle tremor in the nervous expansion contained therein, which is transmitted to the brain; and the mind is thus informed of the presence of sound, and feels a sensation proportioned to the force or to the weakness of the impression

that is made. Let us rejoice that we possess the faculty of hearing; for without it, our state would be most wretched and deplorable; in some respects, more sorrowful than the loss of sight; had we been born deaf, we could not have acquired knowledge sufficient to enable us to pursue any art or science. Let us never behold those who have the misfortune to be deaf, without endeavouring better to estimate the gift of which they are deprived, and which we enjoy; or without praising the goodness of God, which has granted it to us: and the best way we can testify our gratitude is, to make a proper use of this important blessing.

We now proceed to a more particular description of THE CURIOSITIES OF THE HUMAN HEART; AND THE CIRCULATION OF THE BLOOD.

—Though no shining sun, nor twinkling star
 Bedeck'd the crimson curtains of the sky;
 Though neither vegetable, beast, nor bird,
 Were extant on the surface of this ball,
 Nor lurking gem beneath; though the great sea
 Slept in profound stagnation, and the air
 Had left no thunder to pronounce its Maker:
 Yet MAN at home, *within himself* might find
 The Deity immense, and in that frame
So fearfully, so wonderfully made!
 See and adore his providence and power.

Smart.

With what admirable skill and inimitable structure is formed that muscular body, situated within the cavity of the chest, and called the human heart! Its figure is somewhat conical, and it is externally divided into two parts: the base, which is uppermost, and attached to vessels; and the apex, which is loose and pointing to the left side, against which it seems to beat. Its substance is muscular, being composed of fleshy fibres, interwoven with each other. It is divided internally into cavities, called auricles and ventricles; from which vessels proceed to convey the blood to the different parts of the body. The ventricles are situated in the substance of the heart, and are separated from each other by a thick muscular substance; they are divided into right and left, and each communicates with its adjoining auricle, one of which is situated on each side the base of the heart. The right auricle receives the blood from the head and superior parts of the body, by means of a large vein; and in the same manner the blood is returned to it from the inferior parts, by all the veins emptying their stores into one, which terminates in this cavity; which, having received a sufficient portion of blood, contracts, and by this motion empties itself into the right ventricle, which also contracting, propels the blood into an artery, which immediately conveys it into the lungs, where

it undergoes certain changes, and then passes through veins into the left auricle of the heart, thence into the left ventricle, by the contraction of which it is forced into an artery, through whose ramifications it is dispersed to all parts of the body, from which it is again returned to the right auricle; thus keeping up a perpetual circulation, for, whilst life remains, the action of the heart never ceases. In a state of health the heart contracts about seventy times in a minute, and is supposed, at each contraction, to propel about two ounces of blood; to do which, the force it exerts is very considerable, though neither the quantity of force exerted, nor of blood propelled, is accurately determined. The heart comprises within itself a world of wonders, and whilst we admire its admirable structure and properties, we are naturally led to consider the wisdom and power of Him who formed it, from whom first proceeded the circulation of the blood, and the pulsations of the heart; who commands it to be still, and the functions instantly cease to act.

This important secret of the circulation of blood in the human body was brought to light by William Harvey, an English physician, a little before the year 1600: and when it is considered thoroughly, it will appear to be one of the most stupendous works of OMNIPOTENCE.

*The blood, the fountain whence the spirits flow,
The generous stream that waters every part
And motion, vigour, and warm life conveys
To every particle that moves or lives,*

—through unnumber'd tube.

*Pour'd by the heart, and to the heart again
Refund'd.*—

Armstrong.

Who in the dark the vital flame illum'd,
And from th' impulsive engine caused to flow
Th' ejaculated streams through many a pipe
Arterial with meand'ring lapse, then bring
Refluent their *purple tribute* to their fount:
Who spun the *sinews'* branchy thread, and twin'd
The azure *veins* in spiral knots, to waft
Life's tepid waves all o'er; or, who with *bones*
Compacted, and with nerves the fabric strung:
Their specious form, their fitness, which results
From figure and arrangement, all declare
Th' Artificer Divine!

Bally.

Again:—

—The nerves, with equal wisdom made.
Arising from the tender brain, pervade
And secret pass in pairs the channel'd bone.
And thence advance through paths and roads unknown.
Form'd of the finest complicated thread,
The num'rous cords are through the body spread.
These subtle channels, such is every nerve,
For vital functions, sense, and motion serve,—
They help to labour and concoct the food,
Refine the *chyle*, and animate the *blood*.

Blackmore.

We now proceed to some CURIOUS AND INTERESTING FACTS CONCERNING RESPIRATION, OR THE ACT OF BREATHING.

Anatomists have, not unaptly, compared the lungs to a sponge; containing, like it, a great number of small cavities, and being also capable of considerable compression and expansion. The air cells of the lungs open into the windpipe by which they communicate with the external atmosphere. The whole internal structure of the lungs is lined by a transparent membrane, estimated by Haller at only the thousandth part of an inch in thickness; but whose surface, from its various convolutions, measures fifteen square feet, which is equal to the external surface of the body. On this extensive and thin membrane innumerable branches of veins and arteries are distributed, some of them finer than hairs; and through these vessels all the blood in the system is successively propelled, by an extremely curious and beautiful mechanism, which will be described in some future article.

The capacity of the lungs varies considerably in different individuals.* On a general average, they may be said to contain about 280 cubic inches, or nearly five quarts of air. By each inspiration about forty cubic inches of air are received into the lungs, and at each expiration the same quantity is discharged. If, therefore, we calculate that twenty respirations take place in a minute, and forty cubic inches to be the amount of each inspiration, it follows, that in one minute, we inhale 800 cubic inches; in an hour, the quantity of air inspired will be 48,000 cubic inches; and in the twenty-four hours, it will amount to 1,152,000 cubic inches. This quantity of air will almost fill 78 wine hogsheads, and would weigh nearly 53 pounds. From this admirable provision of nature, by which the blood is made to pass in review, as it were, of this immense quantity of air, and over so extensive a surface, it seems obvious, that these two fluids are destined to exert some very important influence on each other; and it has been proved, by a very decisive experiment of Dr. Priestley's, that the extremely thin membrane, which is alone interposed, does not prevent the exercise of the chemical affinity which prevails between the air which is received in the lungs, and the blood which is incessantly circulating through them. It must surely, therefore, be of the first importance to health, that the fluid of which we hourly inhale, at least, three hogsheads, should not be contaminated by the suspension of noxious effluvia.

* An instrument, called the Pulmometer, has been invented, which enables us to measure the capacity of the lungs, and which may communicate information to the physician, of some importance, in diseases of this organ.

The purity of the atmosphere may be impaired either by the operation of what some denominate natural causes, or by the influence of circumstances resulting from our social condition. Its chemical constitution is changed by respiration; the vital principle is destroyed, and its place supplied by a highly poisonous gas.

The emanations from the surface of our bodies contribute, in a still greater degree, to vitiate the atmosphere, and to render it less fit for the healthful support of life. Many of the organs which compose our wonderfully complicated frame are engaged in discharging the constituent parts of our bodies, which, by the exercise of the various animal functions, are become useless, and, if retained, would become noxious. Physiologists have instituted a variety of experiments, to ascertain the amount of the exhalations from the surface of the body. Sanctorius, an eminent Italian physician, from a series of experiments performed during a period of thirty years, estimates it as greater than the aggregate of all our other discharges. From his calculations it would appear, that if we take of liquid and solid food eight pounds in the twenty-four hours, that five pounds are discharged by perspiration alone, within that period; and of this, the greater part is what has been denominated insensible perspiration, from its not being cognizable to the senses. We may estimate the discharge from the surface of the body, by sensible and insensible perspiration, as from half an ounce to four ounces per hour.

The exhalations from the lungs and the skin are, to a certain extent, offensive even in the most healthy individuals; but when proceeding from those labouring under disease they are in a state very little removed from putrefaction.

Animal miasmata, like all other poison, become more active in proportion to the quantity which we imbibe. When, therefore, the air is stagnant, and when many individuals contribute their respective supplies of effluvia to vitiate it, the atmosphere necessarily becomes saturated with the poison; and when inhaled, conveys it in a more virulent and concentrated state to the extensive and delicate surface of the lungs.

The collection of animal effluvia in confined places, is the source of the generation and diffusion of febrile infection. but when the miasmata are respired, in a diluted state, the ill effects which they produce, though slower in their operation, are equally certain. They, to a certain extent, pollute the fountain of life, and ultimately break down the vigour of the most robust frame; impairing the action of the digestive organs, engendering the whole train of nervous disorders, and rendering the body more susceptible of disease.

The lungs and the skin may equally become the means of introducing poisonous or infectious matter into the constitu-

tion. The venom of a poisonous animal, the matter of small-pox, and many other contagions, produce their influence through the medium of the skin. Infectious diseases are communicated by the reception of air in our lungs, impregnated with contagious matter. The influence of the constant respiration of air in any degree impure, is fully evinced in the pallid countenances and languid frames of those who live in confined and ill-ventilated places; and the health of all classes of society suffers precisely in proportion to the susceptibility of their constitutions, and according to the greater or less impurities of the air which they habitually respire.

Of the offensive nature of animal effluvia, the senses of every one who enters a crowded assembly, must immediately convince him. When, therefore, we reflect on the state of the air which we breathe in churches, theatres, schools, and all crowded assemblies; and when we consider the amount of the exhalations emitted by each individual, and the very offensive nature of those emitted by many; and when, on the other hand, we take into consideration the importance of air to life, and the great quantity of this fluid which we daily respire, we must be naturally led to the adoption of such measures as would secure in our private dwellings, as well as in our public buildings, a full and unintermitting supply of fresh atmospheric air.

It is curious to observe the influence of habit, in reconciling us to many practices which would otherwise be considered in the highest degree offensive. Thus, while, with a fastidious delicacy, we avoid drinking from a cup which has been already pressed to the lips of our friends, we feel no hesitation in receiving into our lungs an atmosphere contaminated by the breath and exhalations of every promiscuous assembly.

“ Were once the energy of air deny’d,
The heart would cease to pour its purple tide
The purple tide forget its wonted play,
Nor back again pursue its curious way.”

The next Subject of Curiosity we shall consider, is, THE HAIR OF THE HEAD.

If we consider the curious structure, and different uses of the hair of our heads, we shall find them very well worth our attention, and discover in them proofs of the wisdom and power of God.

In each entire hair we perceive with the naked eye, an oblong slender filament, and a bulb at the extremity thicker and more transparent than the rest of the hair. The filament forms the body of the hair, and the bulb the root. The large hairs have their root, and even part of the filament, enclosed in a small membraneous vessel or capsule. The size of this

sheath is proportionate to the size of the root, being always rather larger, that the root may not be too much confined, and that some space may remain between it and the capsule. The root or bulb has two parts, the one external, the other internal. The external is a pellicle composed of small laminae; the internal is a glutinous fluid, in which some fibres are united; it is the marrow of the root. From the external part of the bulb proceed five, and sometimes, though rarely, six small white threads, very delicate and transparent, and often twice as long as the root. Besides these threads, small knots are seen rising in different places; they are viscous, and easily dissolved by heat. From the interior part of the bulb proceeds the body of the hair, composed of three parts; the external sheath, the interior tubes, and the marrow.

When the hair has arrived at the pore of the skin through which it is to pass, it is strongly enveloped by the pellicle of the root, which forms here a very small tube. The hair then pushes the cuticle before it, and makes of it an external sheath, which defends it at the time when it is still very soft. The rest of the covering of the hair, is a peculiar substance, and particularly transparent at the point. In a young hair this sheath is very soft, but in time becomes so hard and elastic, that it springs back with some noise when it is cut. It preserves the hair a long time. Immediately beneath the sheath are several small fibres, which extend themselves along the hair from the root to the extremity. These are united amongst themselves, and with the sheath that is common to them, by several elastic threads; and these bundles of fibres form together a tube filled with two substances; the one fluid, the other solid; and these constitute the marrow of the hair.

The wonders of creating power are seen in every thing, even in the hair that adorns our surface.

All are but parts of one stupendous whole,
Whose body Nature is, and God the soul.
That, chang'd thro' all, and yet in all the same;
Great in the earth, as in th' ethereal frame;
Warms in the sun, refreshes in the breeze,
Glow's in the stars, and blossoms in the trees,
Lives thro' all life, extends thro' all extent,
Spreads undivided, operates unspent;
Breathes in our soul, informs our mortal part.
As full, as perfect, in a hair as heart;
As full, as perfect, in vile Man that mourns,
As the rapt seraph that adores and burns:
To him no high, no low, no great, no small;
He fills, he bounds, connects, and equals all.

Pope.

We shall now introduce to our readers some *Ancient and Modern Opinions respecting the Hair*.

The ancients held the hair a sort of excrement, fed only

with excrementitious matters, and no proper part of a living body. They supposed it generated of the fuliginous parts of the blood, exhaled by the heat of the body to the surface, and then condensed in passing through the pores. Their chief reasons were, that the hair being cut, will grow again, even in extreme old age, and when life is very low; that in hectic and consumptive people, where the rest of the body is continually emaciating, the hair thrives; nay, that it will even grow again in dead carcases. They added, that hair does not feed and grow like the other parts, by intromission, i. e. by a juice circulating within it, but, like the nails, by juxtaposition. But the moderns are agreed, that every hair properly and truly lives, and receives nutriment to fill it, like the other parts; which they prove hence, that the roots do not turn grey in aged persons sooner than the extremities, but the whole changes colour at once; which shews that there is a direct communication, and that all the parts are affected alike. In strict propriety, however, it must be allowed, that the life and growth of hairs is of a different kind from that of the rest of the body, and is not immediately derived therefrom, or reciprocated therewith. It is rather of the nature of vegetation. They grow as plants do, or as some plants shoot from the parts of others; from which, though they draw their nourishment, yet each has, as it were, its distinct life and economy. They derive their food from some juices in the body, but not from the nutritious juices of the body; whence they may live, though the body be starved. Wulferus, in the *Philosophical Collections*, gives an account of a woman buried at Nurenberg, whose grave being opened forty-three years after her death, hair was found issuing forth plentifully through the clefts of the coffin. The cover being removed, the whole corpse appeared in its perfect shape; but, from the crown of the head to the sole of the foot, covered over with thick-set hair, long and curled. The sexton going to handle the upper part of the head with his fingers, the whole fell at once, leaving nothing in his hand but a handful of hair: there was neither skull nor any other bone left: yet the hair was solid and strong. Mr. Arnold, in the same collection, gives a relation of a man hanged for theft, who, in a little time, while he yet hung upon the gallows, had his body strangely covered over with hair.

Before we dismiss this subject, we shall give the following curious *Instances of the Internal Growth of Hair*.

Though the external surface of the body is the natural place for hairs, we have many well-attested instances of their being found also on the internal surface. Amatus Lusitanus mentions a person who had hair upon his tongue. Pliny and Valerius Maximus say, that the heart of Aristomenes the

Messenian, was hairy. Cællus Rhodiginus relates the same of Hermogenes the rhetorician; and Plutarch, of Leonidas king of Sparta. Hairs are said to have been found in the breasts of women, and to have occasioned the distemper called *trichiasis*; but some authors are of opinion, that these are small worms, and not hairs. There have been, however, various and indisputable evidences of hairs found in the kidneys, and voided by natural discharge. Hippocrates says, that the glandular parts are the most subject to hair; but bundles of hair have been found in the muscular parts of beef, and in parts of the human body equally firm. Hair has been often found in abscesses and imposthumations. Schultetus, opening the abdomen of a human body, found twelve pints of water, and a large lock of hair swimming loosely in it. It has, however, been found on examination, that some of the internal parts of the body are more subject to an unnatural growth of hair than others. This has long been known to anatomists; and many memorable instances have been recorded by Dr. Tyson, and others. In some animals, hairs of a considerable length have been discovered growing in the internal parts; and on several occasions, they have been found lying loosely in the cavities of the veins. There are instances of mankind being affected in the same manner. Cardan relates, that he found hair in the blood of a Spaniard; Slonatus, in that of a gentlewoman of Cracovia; and Schultetus declares, from his own observation, that those people, who are afflicted with the *plica polonica*, have very often hair in their blood.

We shall, in the next place, call the reader's attention to some CURIOUS REMARKS CONCERNING THE BEARD.

A beard gives to the countenance a rough and fierce air suited to the manners of a rough and fierce people. The same face without a beard appears milder; for which reason, a beard becomes unfashionable in a polished nation. Demosthenes, the orator, lived in the same period with Alexander the Great, at which time the Greeks began to leave off beards. A bust, however, of that orator, found in Herculaneum, has a beard, which must either have been done for him when he was young, or from reluctance in an old man to a new fashion. Barbers were brought to Rome from Sicily, the 454th year after the building of Rome. And it must relate to a time after that period, what Aulus Gellius says, that people accused of any crime were prohibited to shave their beards till they were absolved. From Hadrian downward, the Roman emperors wore beards. Julius Capitolinus reproaches the Emperor Verus for cutting his beard at the instigation of a concubine. All the Roman generals wore beards in Justinian's time. The pope shaved his beard, which was held a

manifest apostasy by the Greek church, because Moses, Jesus Christ, and even God the Father, were always drawn with beards by the Greek and Latin painters. Upon the dawn of smooth manners in France, the beaus cut the beards into shapes, and curled the whiskers. That fashion produced a whimsical effect: men of gravity left off beards altogether. A beard, in its natural shape, was too fierce even for them; and they could not, for shame, copy after the beaus. This accounts for a regulation, anno 1534, of the University of Paris, forbidding the professors to wear a beard.

Now follows, *A curious account of WOMEN with Beards.*

Of women remarkably bearded we have several instances. In the cabinet of curiosities at Stutgard, in Germany, there is the portrait of a young woman, called *Bartel Graetje*, whose chin is covered with a very large beard. She was drawn in 1787, at which time she was but twenty-five years of age. There is likewise, in another cabinet, the same portrait of her when she was more advanced in life, but likewise with a beard. It is said, that the Duke of Saxony had the portrait of a poor Swiss woman taken, remarkable for her long bushy beard; and those who were at the carnival of Venice in 1726, saw a female dancer astonish the spectators, not more by her talents, than by her chin covered with a black bushy beard. Charles XII. had in his army a female grenadier, who wanted neither courage nor a beard to be a man. She was taken at the battle of Pultowa, and carried to Petersburg, where she was presented to the czar, in 1724: her beard measured a yard and a half. We read in the *Trevoux Dictionary*, that there was a woman seen at Paris, who had not only a bushy beard on her face, but her body likewise covered all over with hair. Among a number of other examples of this nature, that of the great Margaret, the governess of the Netherlands, is very remarkable. She had a very long stiff beard, which she prided herself on: and being persuaded that it contributed to give her an air of majesty, she took care not to lose a hair of it. It is said, that the Lombard women, when they were at war, made themselves beards with the hair of their heads, which they ingeniously arranged on their cheeks, that the enemy, deceived by the likeness, might take them for men. It is asserted, after Suidas, that in a similar case the Athenian women did as much. These women were more men than our *Jemmy-Tessamy* countrymen. About a century ago, the French ladies adopted a mode of dressing their hair in such a manner, that curls hung down their cheeks as far as their bosom. These curls went by the name of *whiskers*. This custom, undoubtedly, was not invented after the example of the Lombard women; to fight men.

We shall close this chapter with some curious observations on SNEEZING.

The practice of saluting the person who sneezed existed in Africa, among nations unknown to the Greeks and Romans. Strada, in his *Account of Monomotapa*, informs us, (*Prol. Acad.*) that when the prince sneezes, all his subjects in the capital are advertised of it, that they may offer up prayers for his safety. The author of the conquest of Peru assures us, that the cacique of Gachoa having sneezed in the presence of the Spaniards, the Indians of his train fell prostrate before him, stretched forth their hands, and displayed to him the accustomed marks of respect, while they invoked the sun to enlighten him, to defend him, and to be his constant guard. The ancient Romans saluted each other on these occasions: and Pliny relates, that Tiberius exacted these signs of homage when drawn in his chariot. Superstition, whose influence debases every thing, had degraded this custom for several ages, by attaching favourable or unfavourable omens to sneezing, according to the hour of the day or night, according to the signs of the zodiac, according as a work was more or less advanced, or according as one had sneezed to the right or to the left. If a man sneezed at rising from table, or from his bed, it was necessary for him to sit or lie down again. 'You are struck with astonishment,' said Timotheus to the Athenians, who wished to return into the harbour with their fleet, because he had sneezed; 'you are struck with astonishment, because among ten thousand there is one man whose brain is moist.' It is singular enough, that so many ridiculous, contradictory, and superstitious opinions, have not abolished those customary civilities which are still preserved equally among high and low. The reason is obvious: they are preserved, because they are esteemed civilities, and because they cost nothing. Among the Greeks, sneezing was almost always a good omen. It excited marks of tenderness, of respect, and attachment. The young Parthenis, hurried on by her passion, resolved to write to Sarpedon an avowal of her love; she sneezes in the most tender and impassioned part of her letter: this is sufficient for her; this incident supplies the place of an answer, and persuades her that Sarpedon is her lover. Penelope, harassed by the vexatious courtship of her suitors, begins to curse them all, and to pour forth vows for the return of Ulysses. Her son Telemachus interrupts her by a loud sneeze. She instantly exults with joy, and regards this sign as an assurance of the approaching return of her husband. (*Hom. Odys.* lib. xvii.). Xenophon was haranguing his troops; a soldier sneezed in the moment when he was exhorting them to embrace a dangerous but necessary resolution. The whole army, moved by this presage, determined to pur

sue the project of their general; and Xenophon orders sacrifices to Jupiter the preserver. This superstitious reverence for sneezing, so ancient, and so universal even in the times of Homer, excited the curiosity of the Greek philosophers, and of the rabbins. These last have a most absurd tradition respecting it. Aristotle remounts likewise to the sources of natural religion, because the brain is the origin of the nerves, of our sentiments, sensations, &c. Such were the opinions of the most ancient and sagacious philosophers of Greece; and mythologists affirmed, that the first sign of life Prometheus's artificial man gave, was by sternutation.



CHAP. II.

CURIOSITIES RESPECTING MAN.—(Continued.)

Difference between the Sexes—Comparative Number of the Sexes at a Birth—Extraordinary Instances of Rapid Growth—Daniel Lambert—Giants—Dwarfs—Kimos—Curious Account of the Abderites—Account of a Country in which the Inhabitants reside in Trees.

DIFFERENCE BETWEEN THE SEXES.

O woman, lovely woman! Nature made you
To temper man!_____

Angels are painted fair to look like you.

There's in you all that we believe of heav'n,

Amazing brightness, purity, and truth,

Eternal joy, and everlasting love!

Otway.

Under his forming hands a creature grew;

_____ adorn'd

With what all earth or heaven could bestow,

To make her amiable._____

Grace was in all her steps, heav'n in her eye,

In every gesture dignity and love.

Milton.

LAVATER has drawn the following characteristic distinctions between the male and female of the human species. The primary matter of which women are constituted, appears to be more flexible, irritable, and elastic, than that of man. They are formed to maternal mildness and affection; all their organs are tender, yielding, easily wounded, sensible, and receptive. Among a thousand females, there is scarcely one without the generic feminine signs,—the flexible, the circular, and the irritable. They are the counterpart of man, taken

out of man, to be subject to man; to comfort him like angels; and to lighten his cares. This tenderness, this sensibility, this light texture of their fibres and organs, this volatility of feeling, render them so easy to conduct and to tempt, so ready of submission to the enterprise and power of the man; but more powerful, through the aid of their charms, than man with all his strength. The female thinks not profoundly; profound thought is the power of the man. Women feel more. **SENSIBILITY** is the power of woman: they often rule more effectually, more sovereignly, than man. They rule with tender looks, tears, and sighs, but not with passion and threats; for if, or *when*, they so rule, they are no longer *women* but *abortions*. They are capable of the sweetest sensibility, the most profound emotion, the utmost humility, and the excess of enthusiasm. In their countenance are the signs of sanctity and inviolability, which every feeling man honours, and the effects of which are often miraculous. Therefore, by the irritability of their nerves, their incapacity for deep inquiry and firm decision, they may easily, from their extreme sensibility, become the most irreclaimable, the most rapturous enthusiasts. Their love, strong and rooted as it is, is very changeable; their hatred almost incurable. Men are most profound; women are more sublime. Man hears the bursting thunder, views the destructive bolt with serene aspect, and stands erect amidst the fearful majesty of the streaming clouds; woman trembles at the lightning, and the voice of distant thunder; and sinks into the arms of man. Woman is in anguish when man weeps, and in despair when man is in anguish; yet has she often more faith than man. Man, without religion, is a diseased creature, who would persuade himself he is well, and needs not a physician; but women without religion are monstrous. A woman with a beard is not so disgusting as a woman who is a free-thinker; her sex is formed to piety and religion: to them Christ first appeared. The whole world is forgotten in the emotion caused by the presence and proximity of him they love. They sink into the most incurable melancholy, as they also rise to the most enraptured heights. Male sensations is more imagination, female more heart. When communicative, they are more communicative than man; when secret, more secret. In general they are more patient, long-suffering, credulous, benevolent, and modest. They differ also in their interior form and appearance. Man is the most firm; woman is the most flexible. Man is the straightest; woman the most bending. Man is serious; woman is gay. Man is the tallest and broadest; woman the smallest and weakest. Man is rough and hard; woman smooth and soft. Man is brown; woman is fair. Man is wrinkly; woman is not. The hair of man is more strong and short; of

woman more long and pliant. The eye-brows of man are compressed; and of woman less frowning. Man has most convex lines; woman most concave. Man has most straight lines; woman most curved. The countenance of man, taken in profile, is more seldom perpendicular than that of woman. Man is most angular; woman most round.

In determining the comparative merit of the two sexes, if it should be found (what is indeed the fact) that women fill up their appointed circle of action with greater regularity than men, the claim of preference must decide in their favour. In the prudential and economical parts of life, they rise far above us.

The following is a very curious calculation of **THE COMPARATIVE NUMBER OF THE SEXES AT A BIRTH.**

The celebrated M. Hufeland, of Berlin, has inserted in his *Journal of Practical Medicine*, some interesting observations in illustration of the comparative numbers of the sexes at a birth. The number of males born, to that of females, observes the learned Professor, seems to be 21 to 20 over the whole earth; and before they reach the age of puberty, the proportion of the sexes is reduced to perfect equality; more boys than girls die before they are fourteen. After extending his interesting comparison over animated nature in general, Professor Hufeland enters into an inquiry, peculiar to himself, in endeavouring to ascertain the principles and commencement of the equality of the sexes. In some families, says he, equality evidently does not hold. In some, the children are all boys; in others, all girls. He next proceeds to take several families, as 20, 30, 40, or 50, in one place, in conjunction; or small villages of 150 or 300 inhabitants. But even then, the just proportion was not yet established. In some years, only boys, in others only girls were born; nay, this disproportion continued for a series of a year or two; but by uniting ten or fifteen years together, the regular equality appeared. He next considered, that what took place in small populations must take place every year in larger societies; and he accordingly found it confirmed by actual enumeration. He went so far as, by the aid of the minister of state, Schackman, to ascertain the comparative number of boys and girls born in one day over the whole Prussian dominions, and the result corresponded with his anticipations. The general conclusions arrived at by M. Hufeland, are as follow:—

1st. There is an equal number of males and females born in the human race.—2d. The equality occurs every day in a population of ten millions.—3d. Every week in 100,000.—4th. Every month in 50,000.—5th. Every year in 10,000.—6th. And in small societies of several families, every ten

or fifteen years.—7th. That it does not occur in individual families.

We now proceed to narrate some **EXTRAORDINARY INSTANCES OF RAPID GROWTH.**

A remarkable instance of rapid growth in the human species was noticed in France, in 1729, by the Academy of Sciences. It was a lad, then only seven years old, who measured four feet eight inches and four lines high, without his shoes. His mother observed his extraordinary growth and strength at two years old, which continued to increase with such rapidity, that he soon arrived at the usual standard. At four years old he was able to lift and throw the common bundles of hay in stables into the horses' racks; and at six years old, he could lift as much as a sturdy fellow of twenty. But although he thus increased in bodily strength, his understanding was no greater than is usual with children of his age; and their play-things were also his favourite amusements.

Another boy, a native of Bouzanquet, in the diocese of Alais, though of a strong constitution, appeared to be knit and stiff in his joints, till he was about four years and a half old. During this time, nothing farther was remarkable respecting him, than an extraordinary appetite, which nothing could satisfy, but an abundance of the common aliments of the inhabitants of the country, consisting of rye bread, chestnuts, bacon, and water. His limbs, however, soon becoming supple and pliable, and his body beginning to expand itself, he grew up in such an extraordinary manner, that at the age of five years he measured four feet three inches. Some months after, he was four feet eleven inches; and at six, five feet, and bulky in proportion. His growth was so rapid, that every month his clothes required to be made longer and wider; yet it was not preceded by any sickness, nor accompanied with any pain. At the age of five years his voice changed, his beard began to appear; and at six, he had as much as a man of thirty; in short, all the unquestionable marks of maturity were visible in him. Though his wit was riper than is commonly observable at the age of five or six, yet its progress was not in proportion to that of his body. His air and manner still retained something childish, though by his bulk and stature he resembled a complete man, which at first sight produced a very singular contrast. His voice was strong and manly, and his great strength rendered him already fit for the labours of the country. At five, he could carry to a great distance, three measures of rye, weighing eighty-four pounds; when turned of six, he could lift up easily to his shoulders, and carry loads of one hundred and fifty pounds weight to a great distance; and these exercises were exhibited by him as often as the curious engaged him thereto by some liberality.

Such beginnings made people think that he should soon shoot up into a giant. A mountebank was already soliciting his parents for him, and flattering them with hopes of putting him in a way of making a great fortune. But all these hopes suddenly vanished. His legs became crooked, his body shrunk, his strength diminished, his voice grew sensibly weaker, and he at last sunk into a total imbecility;—thus his rapid maturity was followed by as swift decay.

In the *Paris Memoirs*, there is an account of a girl, who, when four years old, was four feet six inches in height, and had her limbs well proportioned, and her breasts fully expanded, like those of a girl of eighteen. These things are more singular and marvellous in the northern than in the southern climates, where females come sooner to maturity. In some places of the East Indies, they have children at nine years of age. It seems at first view astonishing, that children of such early and prodigious growth do not become giants; but it appears evident, that the whole is only a premature expansion of the parts; and accordingly, such children, instead of becoming giants, always decay and die apparently of old age long before the natural term of human life.

As it is our intention in this work to keep as close as possible to facts, we shall not, knowingly, deal in fiction or fable. It is from a most respectable source that we have derived the following CURIOUS ACCOUNT OF GIANTS.

M. Le Cat, in a memoir read before the Academy of Sciences at Rouen, gives the following account of giants that are said to have existed in different ages. Profane historians have given seven feet of height to Hercules, their first hero: and in our days we have seen men eight feet high. The giant, who was shown in Rouen, in 1735, measured eight feet some inches. The emperor Maximin was of that size. Shenki is and Platerus, physicians of the last century, saw several of that stature; and Goropius saw a girl who was ten feet high. The body of Orestes, according to the Greeks, was eleven feet and a half; the giant Galbara, brought from Arabia to Rome, under Claudius Cæsar, was near ten feet; and the bones of Secondilla and Pusio, keepers of the gardens of Sallust, were but six inches shorter. Funnam, a Scotsman, who lived in the time of Eugene II. king of Scotland, measured eleven feet and a half; and Jacob Le Maire, in his voyage to the Straits of Magellan, reports, that on the 17th of December, 1615, they found at Port Desire, several graves covered with stones; and having the curiosity to remove the stones, they discovered human skeletons of ten and eleven feet long. The Chevalier Scory, in his voyage to the Peak of Teneriffe, says, that they found, in one of the sepulchral caverns of that mountain, the head of a gaunche, which had eighty teeth, and that the body was not less than fifteen feet long. The

giant Ferragus, slain by Orlando, nephew of Charlemagne, was eighteen feet high. Rioland, a celebrated anatomist, who wrote in 1614, says, that some years before, there was to be seen, in the suburbs of St. Germain, the tomb of the great giant Isoret, who was twenty feet high. In Rouen, in 1509, in digging in the ditches near the Dominicans, they found a stone tomb, containing a skeleton whose skull held a bushel of corn, and whose shin bone reached up to the girdle of the tallest man there, being about four feet long; and, consequently, the body must have been seventeen or eighteen feet high. Upon the tomb was a plate of copper, whereon was engraved, "In this tomb lies the noble and puissant lord, the Chevalier Ricon De Vallemont, and his bones." Platerus, a famous physician, declares, that he saw at Lucerne, the true human body of a subject which must have been at least nineteen feet high. Valence, in Dauphiné, boasts of possessing the bones of the giant Bucart, tyrant of the Vivariae, who was slain with an arrow by the Count De Cabillon, his vassal. The Dominicans had a part of the shin bone, with the articulation of his knee, and his figure painted in fresco, with an inscription, showing "that this giant was twenty-two feet and a half high, and that his bones were found in 1705, near the banks of the Morderi, a little river at the foot of the mountain of Crusal, upon which (tradition says) the giant dwelt." M. Le Cat adds, that skeletons have been discovered of giants, of a still more incredible height, viz. of Theutobochus, king of the Teutones, found on the 11th of January, 1613, twenty-five feet and a half high; of a giant near Mazarino, in Sicily, in 1516, thirty feet; of another, in 1548, near Palermo, thirty feet; of another, in 1550, of thirty-three feet; of two found near Athens, thirty-three and thirty-six feet; and of one at Tuto, in Bohemia, in 1758, whose leg bones alone measured twenty-six feet! But whether these accounts are credited or not, we are certain that the stature of the human body is by no means fixed. We are ourselves a kind of giants, in comparison of the Laplanders; nor are these the most diminutive people to be found upon the earth.

The Abbé La Chappe, in his journey into Siberia, to observe the last transit of Venus, passed through a village inhabited by people called Wotiacks, who were not above four feet high. The accounts of the Patagonians likewise, which cannot be entirely discredited, render it very probable, that somewhere in South America there is a race of people very considerably exceeding the common size of mankind; and consequently that we cannot altogether discredit the relations of giants, handed down to us by ancient authors, though what degree of credit we ought to give them, is not easy to be determined.

DANIEL LAMBERT, the Fat Man.—This prodigy of corpulence, or obesity, was born at Leicester, March 13, 1770. He became keeper of the prison in his native town. He first went to London for exhibition, in 1806, and was visited by persons of all ranks, and was considered the then wonder of the world. After this he travelled over England, and astonished every beholder by his immense bulk. He was very polite, shrewd, and well informed. This extraordinary man died at Stamford, on the 21st of June, 1809. He had travelled from Huntingdon to that town; and on the Tuesday before his death, he sent a message to the office of the Stamford newspaper, requesting, that “as the mountain could not wait upon Mahomet, Mahomet would go to the mountain;” or, in other words, that the printer would call upon him, and receive an order for executing some handbills, announcing Mr. Lambert’s arrival, and his desire to see company in that town. The orders he gave upon that occasion were delivered without any presentiment that they were to be his last, and with his usual cheerfulness; he was then in bed, only fatigued from his journey, and anxious to be able to see company early in the morning. However, before nine o’clock, the day following, he was a corpse. His corpulency had been gradually increasing, until nature could no longer support it. He was in his 40th year; and upon being weighed within a few days, by the famous Caledonian balance, in the possession of Mr. King, of Ipswich, was found to be 52 stone, 11 lbs. in weight, (14 lb. to the stone,) which is 10 stone 11 lb. more than the great Mr. Bright, of Essex, weighed.

No less true than remarkable is the following **CURIOUS ACCOUNT OF DWARFS:**

Jeffery Hudson, the famous English dwarf, was born at Oakham in Rutlandshire, in 1619; and about the age of seven or eight, being then but eighteen inches high, was retained in the service of the Duke of Buckingham, who resided at Burleigh on the Hill. Soon after the marriage of Charles I. the king and queen being entertained at Burleigh, little Jeffrey was served up to table in a cold pie, and presented by the duchess to the queen, who kept him as her dwarf. From seven years till thirty, he never grew taller; but after thirty he shot up to three feet nine inches, and there fixed. Jeffery became a considerable part of the entertainment of the court. Sir William Davenant wrote a poem called *Jeffreidos*, on a battle between him and a turkey cock; and in 1638 was published a very small book, called the *New Year’s Gift*, presented at court by the Lady Parvula to the Lord Minimus, (commonly called *Little Jeffery*.) her majesty’s servant, written by Microphilus, with a little print of Jeffery prefixed. Before

this period. Jeffery was employed on a negotiation of great importance: he was sent to France to fetch a midwife for the queen; and on his return with this gentlewoman, and her majesty's dancing-master, and many rich presents to the queen from her mother Mary de Medicis, he was taken by the Dunkirkers. Jeffery, thus made of consequence, grew to think himself really so. He had borne with little temper the teasing of the courtiers and domestics, and had many squabbles with the king's gigantic porter. At last, being provoked by Mr. Crofts, a young gentleman of family, a challenge ensued: and Mr. Crofts coming to the rendezvous armed only with a squirt, the little creature was so enraged, that a real duel ensued; and the appointment being on horseback, with pistols, to put them more on a level, Jeffery, at the first fire, shot his antagonist dead. This happened in France, whither he had attended his mistress during the troubles. He was again taken prisoner by a Turkish rover, and sold into Barbary. He probably did not remain long in slavery, for, at the beginning of the civil war, he was made a captain in the royal army; and in 1644, attended the queen to France, where he remained till the Restoration. At last, upon suspicion of his being privy to the Popish plot, he was taken up in 1682, and confined in the Gate-house of Westminster, where he ended his life in the sixty-third year of his age.

In the memoirs of the Royal Academy of Sciences, a relation is given by the Count de Tressau, of a dwarf, called *Bebe*, kept by Stanislaus III. king of Poland; who died in 1764, aged twenty-three, when he measured only thirty-three inches. At his birth, he measured only between eight and nine inches. Diminutive as were his dimensions, his reasoning faculties were not less scanty; appearing indeed not to have been superior to those of a well-taught pointer: but, that the size and strength of the intellectual powers are not affected by the diminutiveness or tenuity of the corporeal organs, is evident from a still more striking instance of littleness, given us by the same nobleman, in the person of Monsieur Borulawski, a Polish gentleman, whom he saw at Luneville, whence he visited Paris, and who, at the age of twenty-two, measured only twenty-eight inches. This miniature of a man, considering him only as to his bodily dimensions, appears a *giant* with regard to his mental powers and attainments. He is described by the count as possessing all the graces of wit, united with a sound judgment and an excellent memory; so that we may with justice say of M. Borulawski, in the words of Seneca, and nearly in the order in which he has used them, "*Posse ingenium, fortissimum ac beatissimum, sub quolibet corpusculo latere.*" Epist. 66. Count Borulawski was the son of a Polish nobleman attached to the

fortunes of King Stanislaus, who lost his property in consequence of that attachment, and who had six children; three dwarfs, and three well grown. What is singular enough, they were born alternately, a big one and a little one, though both parents were of the common size. The little count's youngest sister was much less than him, but died at the age of twenty-three. The count continued to grow till he was about thirty, when he had attained the height of three feet two inches: he lived to see his fifty-first year. He never experienced any sickness, but lived in a polite and affluent manner, under the patronage of a lady, a friend of the family, till love, at the age of forty-one, intruded into his little peaceful bosom, and involved him in matrimony, care, and perplexity. The lady he chose was of his own country, but of French extraction, and the middle size. They had three children, all girls, and none of them likely to be dwarfs. To provide for a family now became an object big with difficulty, requiring all the exertion of his powers (which could promise but little) and his talents, of which music alone afforded any view of profit. He played extremely well upon the guitar; and by having concerts in several of the principal cities in Germany, he raised temporary supplies. At Vienna he was persuaded to turn his thoughts to England, where, it was believed, the public curiosity might in a little time benefit him sufficiently to enable him to live independent in so cheap a country as Poland. He was furnished by very respectable friends with recommendations to several of the most distinguished characters in this kingdom, as the Duchess of Devonshire, Rutland, &c. whose kind patronage he was not backward to acknowledge. He was advised to let himself be seen as a curiosity, and the price of admission was fixed at a guinea. The number of his visitors, of course, was not very great. After a pretty long stay in London, he went to Bath and Bristol; visited Dublin, and some other parts of Ireland; whence he returned by way of Liverpool, Manchester, and Birmingham, to London. He also visited Edinburgh, and some other towns in Scotland. In every place he acquired a number of friends. In reality, the ease and politeness of his manners and address pleased no less than the diminutive yet elegant proportions of his figure, astonished those who visited him. His person was pleasing and graceful, and his look manly and noble. He spoke French fluently, and English tolerably. He was remarkably lively and cheerful, though fitted for the most serious and rational conversation. Such was this wonderful little man—an object of curiosity really worthy the attention of the philosopher, the man of taste, and the anatomist. His life has been published, written by himself.



DANIEL LAMBERT.



GEORGE MORLAND.



BLACK BUFFALO.

The following account of a singular nation of dwarfs, is taken from the Monthly Review for 1792, being Vol. 7, of the new series. The subject is a review of "A Voyage to Madagascar; by the Abbé Rochon." They are called THE KIMOS.

The Kimos are a nation of pigmies, said to inhabit the mountains in the interior part of the island of Madagascar, of whom tradition has long encouraged the belief:—but Flacourt, in the last century, treated the stories then in circulation with great contempt. The Abbé Rochon, however, has revived them; and has not only given them the sanction of his own belief, but that of *M. Commerson*, and of *M. de Modave*, the late Governor of Fort Dauphin. As their opinions are of weight, and as the subject is curious, we shall present our readers with an epitome of the memoirs which these gentlemen drew up concerning the *Kimos*, and which our author has inserted entire in the body of his work.

"Lovers of the marvellous, (says *M. Commerson*,) who would be sorry to have the pretended size of the Patagonian giants reduced to six feet, will perhaps be made some amends by a race of pigmies, who are wonderful in the contrary extreme. I mean those half men, who inhabit the interior part of the great island of Madagascar, and form a distinct nation, called, in the language of the country, *Kimos*. These little men are of a paler colour than the rest of the natives, who are in general black. Their arms are so long, that when stretched out, they reach to the knees, without stooping. The women have scarcely breasts sufficient to mark their sex, except at the time of lying-in; and even then they are obliged to have recourse to cow's milk, to feed their children.

"The intellectual faculties of this diminutive race are equal to those of the other inhabitants of the island, who are by no means deficient in understanding, though extremely indolent. Indeed, the Kimos are said to be much more active and warlike, so that their courage being in a duplicate ratio of their size, they have never suffered themselves to be oppressed and subdued by their neighbours, who have often attempted it. It is astonishing, that all we know of this nation is from the neighbouring people; and that neither the governors of the Isle of France, of Bourbon, nor the commanders of our forts on the coast of Madagascar, have ever endeavoured to penetrate into this country. It has indeed been lately attempted, but without success.

"I shall however attest, as an eye-witness, that in a voyage which I made in 1770 to Fort Dauphin, *M. de Modave*, the last governor, gratified my curiosity, by shewing me, among his slaves, a female of the Kimos tribe, about thirty years of age, and three feet seven inches high. She was of a much

paler colour than any other natives of Madagascar that I had seen, was well made, and did not appear misshapen, nor stunted in her growth, as accidental dwarfs usually are. Her arms were indeed too long, in proportion to her height, and her hair was short and woolly: but her countenance was good, and rather resembled that of an European than an African. She had a natural habitual smile on her face, was good-humoured, and seemed, by her behaviour, to possess a good understanding. No appearance of breasts was observable, except nipples: but this single instance is not sufficient to establish an exception so contrary to the general law of nature. A little before our departure from Madagascar, the desire of recovering her liberty, joined to the fear of being carried into France, stimulated this little slave to run away into the woods.

"On the whole, I conclude, in firmly believing the existence of this diminutive race of human beings, who have a character and manners peculiar to themselves. The Laplanders seem to be the medium between men of the common size and these dwarfs. Both inhabit the coldest countries and the highest mountains upon the earth. These of Madagascar, on which the *Kimos* reside, are sixteen or seventeen hundred toises, or fathoms, above the level of the sea. The plants and vegetables which grow on these heights, are naturally dwarfs."

M. de Modave says,—“When I arrived at Fort Dauphin, in 1768, I had a memoir put into my hands, which was ill drawn up, giving an account of a pigmy race of people, called *Kimos*, who inhabit the middle region of Madagascar, in latitude 22°. I tried to verify the fact, by preparing for an expedition into the country which is said to be thus inhabited: but by the infidelity and cowardice of the guides, my scheme failed. Yet I had such indisputable information of this extraordinary fact, that I have not the least doubt of the existence of such a nation. The common size of the men is three feet five inches. They wear long round beards. The women are some inches shorter than the men, who are thick and stout. Their colour is less black and swarthy than that of the natives; their hair is short and cottony. They forge iron and steel, of which they make their lances and darts; the only weapons that they use. The situation of their country is about sixty leagues to the north-west of Fort Dauphin. I procured a female of this nation, but she was said to be much taller than usual among the *Kimos*, for she was three feet seven inches in height. She was very thin, and had no more appearance of breasts than the leanest man.”

To these relations, the *Abbé Rochon* says, he might add that of an officer who had procured a *Kimos* man, and would have brought him to Europe, but M. de Surville, who commanded

the vessel in which he was to embark, refused to grant his permission.

Respectable historians have presented us with the following curious account of the **ABDERITES**, or **INHABITANTS OF ABDERA**.

It is reported, that in the reign of Cassander, king of Macedon, they were so pestered with frogs and rats, that they were obliged to desert their city for some time: and Lucian tells us, that in the reign of Lysimachus, they were for some months afflicted with a fever of a most extraordinary nature, whose crisis was always on the seventh day, and then it left them; but it so distracted their imaginations, that they fancied themselves players. After this, they were ever repeating verses from some tragedy, and particularly out of the *Andromeda* of Euripides, as if they had been upon the stage; so that many of these pale, meagre actors, were pouring forth tragic exclamations in every street. This delirium continued till the winter following; which was a very cold one, and therefore fitter to remove it. Lucian, who has described this disease, endeavours to account for it in this way:— Archelaus, an excellent player, acted the *Andromeda* of Euripides before the Abderites, in the height of a very hot summer. Several had a fever at their coming out of the theatre, and as their imaginations were full of the tragedy, the delirium, which the fever raised, perpetually represented *Andromeda*, *Perseus*, *Medusa*, &c. and the several dramatic incidents, and called up the ideas of those objects, and the pleasure of the representation, so strongly, that they could not forbear imitating Archelaus' action and declamation: and from these the fever spread to others by infection.

A most respectable writer (*Madame De Genlis*) has given us the following curious account of a **COUNTRY, THE INHABITANTS OF WHICH RESIDE IN TREES**.

A young Spanish adventurer, of the name of *Vasco Nugnez*, whom a handsome figure, united to a natural wit and courage, advanced to the highest eminence of glory and fortune; pursuing his researches over the *Darien*, a region abounding in lakes and marshes, arrived in a country where the houses were of a very singular contrivance, being built in the largest trees, the branches of which enveloped the sides, and formed the roof. They contained chambers and closets of a tolerable construction. Each family was separately lodged. Every house had two ladders, one of which reached from the foot to the middle of the tree, and the other from thence to the entrance of the highest chamber: they were composed of cane, and so light as to be easily lifted up, which was done every

night, and formed a security from the attacks of tigers and other wild beasts, with which this province abounds. The chief of the country was in his palace, that is to say—his tree, when the Castilians came among them. On seeing the strangers, he hastened to draw up his ladders, while the Spaniards called to him aloud to descend without fear. He replied, that being unconscious of having offended any one, and having no concern with strangers, he begged he might be suffered to remain undisturbed in his habitation. On this they threatened to cut down or set fire to his tree, and at length obliged him to descend with his two sons. To their inquiries, 'if he had any gold,' he replied, that he had none there, because it was of no use to him; but, if they would suffer him to go, he would fetch them some from a neighbouring mountain. The Castilians the more readily believed the promise, as he consented to leave with them his wife and children. But after having waited some days for his return, they discovered that this pretence was only a stratagem to withdraw himself from their hands; that their hostages likewise, during the night, had found an opportunity of escaping by means of their ladders, and that the inhabitants of every neighbouring tree had, in the same manner, fled.



CHAP. III.

CURIOSITIES RESPECTING MAN.—(Continued.)

Astonishing Acquisitions made by Blind Persons—Wonderful Performances of a Female, blind almost from Infancy—Wonderful Instances of Adroitness of Persons born defective in their Limbs—Curious Account of Incapacity of distinguishing Colours—Ventriloquism—Sword-swallowing Jugglers.

ASTONISHING ACQUISITIONS MADE BY BLIND PERSONS.

WE find various recompenses for blindness, or substitutes for the use of the eyes, in the wonderful sagacity of many blind persons, recited by Zahnius, in his '*Oculus Artificialis*,' and others. In some, the defect has been supplied by a most excellent gift of remembering what they had seen; in others, by a delicate nose, or the sense of smelling; in others, by an exquisite touch, or a sense of feeling, which they have had in such perfection, that, as it has been said of some, they learned to hear with their eyes, so it may be said of these, that they taught themselves to see with their hands. Some have been enabled to perform all sorts of curious and subtle works in

the nicest and most dexterous manner.—Aldrovanus speaks of a sculptor who became blind at twenty years of age, and yet, ten years after, made a perfect marble statue of Cosmo II. de Medicis; and another of clay, like Urban VIII. Bartholin tells us of a blind sculptor in Denmark, who distinguished perfectly well, by mere touch, not only all kinds of wood but all the colours; and F. Grimaldi gives an instance of the like kind; besides the blind organist, living in Paris, who is said to have done the same. The most extraordinary of all is a blind guide, who, according to the report of good writers, used to conduct the merchants through the sands and deserts of Arabia.

James Bernouilli contrived a method of teaching blind persons to write. An instance, no less extraordinary, is mentioned by Dr. Bew, in the "Transactions of the Manchester Society." It is that of a person, whose name is John Metcalf, a native of the neighbourhood of Manchester, who became blind at so early an age as to be altogether unconscious of light, and its various effects. His employment in the younger period of his life was that of a waggoner, and occasionally as a guide in intricate roads during the night, or when the common tracks were covered with snow. Afterwards he became a projector and surveyor of highways in difficult and mountainous parts; and, in this capacity, with the assistance merely of a long staff, he traverses the roads, ascends precipices, explores valleys, and investigates their several extents, forms, and situations, so as to answer his purpose in the best manner. His plans are designed, and his estimates formed, with such ability and accuracy, that he has been employed in altering most of the roads over the Peak in Derbyshire, particularly those in the vicinity of Buxton; and in constructing a new one between Wilmslow and Congleton, so as to form a communication between the great London road, without being obliged to pass over the mountain.

Although blind persons have occasion, in a variety of respects, to deplore their infelicity, their misery is in a considerable degree alleviated by advantages peculiar to themselves. They are capable of a more fixed and steady attention to the objects of their mental contemplation, than those who are distracted by the view of a variety of external scenes. Their want of sight naturally leads them to avail themselves of their other organs of corporeal sensation, and with this view to cultivate and improve them as much as possible. Accordingly, they derive relief and assistance from the quickness of their hearing, the acuteness of their smell, and the sensibility of their touch, which persons who see are apt to disregard.

Many contrivances have also been devised by the ingenious,

for supplying the want of sight, and for facilitating those analytical or mechanical operations, which would otherwise perplex the most vigorous mind, and the most retentive memory. By means of these, they have become eminent proficient in various departments of science. Indeed, there are few sciences in which, with or without mechanical helps, the blind have not distinguished themselves. The case of Professor Saunderson at Cambridge, is well known. His attainments and performances in the languages, and also as a learner and teacher in the abstract mathematics, in philosophy, and in music, have been truly astonishing; and the account of them appears to be almost incredible, if it were not amply attested and confirmed by many other instances of a similar kind, both in ancient and modern times.

Cicero mentions it as a fact scarcely credible, with respect to his master in philosophy, Diodotus, that "he exercised himself in it with greater assiduity after he became blind; and, which he thought next to impossible to be performed without sight, that he professed geometry, and described his diagrams so accurately to his scholars, as to enable them to draw every line in its proper direction."

Jerome relates a more remarkable instance of Didymus in Alexandria, who "though blind from his infancy, and therefore ignorant of the letters, appeared so great a miracle to the world, as not only to learn logic, but geometry also to perfection; which seems (he adds) the most of any thing to require the help of sight."

Professor Saunderson, who was deprived of his sight by the small-pox when he was only twelve months old, seems to have acquired most of his ideas by the sense of feeling; and though he could not distinguish colours by that sense, which, after repeated trials, he said was pretending to impossibilities, yet he was able, with the greatest exactness, to discriminate the minutest difference between rough and smooth on a surface, or the least defect of polish. In a set of Roman medals, he could distinguish the genuine from the false, though they had been counterfeited in such a manner as to deceive a connoisseur, who judged of them by the eye. His sense of feeling was so acute, that he could perceive the least variation in the state of the air; and, it is said, that in a garden where observations were made on the sun, he took notice of every cloud that interrupted the observation, almost as justly as those who could see it. He could tell when any thing was held near his face, or when he passed by a tree at no great distance, provided the air was calm, and there was little or no wind; this he did by the different pulse of air upon his face. He possessed a sensibility of hearing to such a degree, that he could distinguish even the fifth part of a note; and,

by the quickness of this sense, he not only discriminated persons with whom he had once conversed so long as to fix in his memory the sound of their voice, but he could judge of the size of a room into which he was introduced, and of his distance from the wall; and if he had ever walked over a pavement in courts, piazzas, &c. which reflected a sound, and was afterwards conducted thither again, he could exactly tell in what part of the walk he was placed, merely by the note which it sounded.

Sculpture and painting are arts which, one would imagine, are of very difficult and almost impracticable attainment to blind persons; and yet instances occur, which shew, that they are not excluded from the pleasing, creative, and extensive regions of fancy.

De Piles mentions a blind sculptor, who thus took the likeness of the Duke de Bracciano in a dark cellar, and made a marble statue of King Charles I. with great justness and elegance. However unaccountable it may appear to the abstract philosopher, yet nothing is more certain in fact, than that a blind man may, by the inspiration of the Muses, or rather by the efforts of a cultivated genius, exhibit in poetry the most natural images and animated descriptions even of visible objects, without deservedly incurring the charge of plagiarism. We need not recur to Homer and Milton for attestations to this fact; they had probably been long acquainted with the visible world before they had lost their sight, and their descriptions might be animated with all the rapture and enthusiasm which originally fired their bosoms, when the grand and delightful objects delineated by them were immediately beheld. We are furnished with instances in which a similar energy and transport of description, at least in a very considerable degree, have been exhibited by those on whose minds visible objects were never impressed, or have been entirely obliterated.

Dr. Blacklock affords a surprising instance of this kind; who, though he had lost his sight before he was six months old, not only made himself master of various languages, Greek, Latin, Italian, and French; but acquired the reputation of an excellent poet, whose performances abound with appropriate images and animated descriptions.

Dr. Nicholas Bacon, a blind gentleman, descended from the same family with the celebrated Lord Verulam, was, in the city of Brussels, with high approbation created LL. D. He was deprived of sight at nine years of age by an arrow from a cross-bow, whilst he was attempting to shoot it. When he had recovered his health, which had suffered by the shock, he pursued the same plan of education in which he had been engaged; and having heard that one Nicasius

de Vourde, born blind, who lived towards the end of the fifteenth century, after having distinguished himself by his studies in the university of Louvain, took his degree as D. D. in that of Cologne, he resolved to make the same attempt. After continuing his studies in learning philosophy and law a sufficient time, he took his degree, commenced pleading as counsellor or advocate in the council of Brabant, and has had the pleasure of terminating almost every suit in which he has been engaged to the satisfaction of his clients.

Another instance, which deserves being recorded, is that of Dr. Henry Moyes, in our own country; who, though blind from his infancy, by the ardour and assiduity of his application, and by the energy of native genius, not only made incredible advances in mechanical operations, in music, and in the languages; but acquired an extensive acquaintance with geometry, optics, algebra, astronomy, chemistry, and all other branches of natural philosophy.

From the account of Dr. Moyes, who occasionally read lectures on philosophical chemistry at Manchester, delivered to the Manchester Society by Dr. Bew, it appears, that mechanical exercises were the favourite employment of his infant years: and that at a very early age he was so well acquainted with the use of edge-tools, as to be able to construct little windmills, and even a loom. By the sound, and the different voices of the persons that were present, he was directed in his judgment of the dimensions of the room in which they were assembled; and in this respect he determined with such a degree of accuracy, as seldom to be mistaken. His memory was singularly retentive; so that he was capable of recognizing a person on his first speaking, though he had not been in company with him for two years. He determined with surprising exactness the stature of those with whom he conversed, by the direction of their voices; and he made tolerable conjectures concerning their dispositions, by the manner in which they conducted their conversation. His eyes, though he never recollected having seen, were not totally insensible to intense light: but the rays refracted through a prism, when sufficiently vivid, produced distinguishable effects upon them. The red produced a disagreeable sensation, which he compared to the touch of a saw. As the colours declined in violence, the harshness lessened, until the green afforded a sensation that was highly pleasing to him, and which he described as conveying an idea similar to that which he gained by running his hand over smooth polished surfaces. Such surfaces, meandering streams, and gentle declivities, were the figures by which he expressed his ideas of beauty; rugged rocks, irregular points, and boisterous elements, furnished him with expressions for terror and disgust.

He excelled in the charms of conversation; was happy in his allusions to visual objects, and discoursed on the nature, composition, and beauty of colours, with pertinence and precision.

This instance, and some others which have occurred, seem to furnish a presumption, that the feeling or touch of blind persons may be so improved as to enable them to perceive that texture and disposition of coloured surfaces by which some rays of light are reflected, and others absorbed; and in this manner to distinguish colours.

In music, there are at present living instances of how far the blind may proceed. In former periods we shall find illustrious examples, how amply nature has capacitated the blind to excel, both in the scientific and practical departments of music.

In the sixteenth century, when the progress of improvement both in melody and harmony was rapid and conspicuous, FRANCIS SALINAS was eminently distinguished. He was born A. D. 1513, at Burgos in Spain; and was son to the treasurer of that city. Though afflicted with incurable blindness, he was profoundly skilled both in the theory and practice of music. As a performer, he is celebrated by his contemporaries with the highest encomiums. As a theorist, Sir John Hawkins says, his book is equal in value to any now extant in any language. Though he was deprived of sight in his earliest infancy, he did not content himself to delineate the various phenomena in music, but the principles from whence they result, the relations of sound, the nature of arithmetical, geometrical, and harmonical ratios, which were then esteemed essential to the theory of music, with a degree of intelligence which would have deserved admiration, though he had been in full possession of every sense requisite for these disquisitions. He was taken to Rome in the retinue of Petrus Sarmentus, archbishop of Compostella, and having passed twenty years in Italy, he returned to Salamanca, where he obtained the professorship of music, an office at that time equally respectable and lucrative. Having discharged it with reputation and success for some time, he died at the venerable age of seventy-seven.

In the same period flourished CASPAR CRUMBHOM, blind from the third year of his age; yet he composed several pieces in many parts with so much success, and performed both upon the flute and violin so exquisitely, that he was distinguished by Augustus, elector of Saxony. But preferring his native country, Silesia, to every other, he returned to it, and was appointed organist of the church of St. Peter and Paul in Lignitz where he had often the direction of the musical college and died June 11, 1621.

To these might be added MARTIN PESENTI of Venice, a composer of vocal and instrumental music almost of all kinds, though blind from his nativity; with other examples equally worthy of public attention. But if vulgar prejudice is capable of blushing at its own contemptible character, or of yielding to conviction, those already quoted are more than sufficient to shew the musical jugglers of our time that their art is no monopoly, with which those alone who see are invested, by the irrevocable decree of heaven.

In the *Annual Register* for 1762, the following narrative of the surprising acquisitions of a blind lady is inserted. "A young gentlewoman of a good family in France, now in her eighteenth year, lost her sight when only two years old, her mother having been advised to lay some pigeon's blood on her eyes, to preserve them in the small-pox; whereas, so far from answering the end, it eat into them. Nature, however, may be said to have compensated for the unhappy mistake, by beauty of person, sweetness of temper, vivacity of genius, quickness of conception, and many talents which certainly much alleviate her misfortune. She plays at cards with the same readiness as others of the party. She first prepares the pack allotted to her, by pricking them in several parts; yet so imperceptibly, that the closest inspection can scarce discern her indexes: she sorts the suits, and arranges the cards in their proper sequence, with the same precision, and nearly the same facility, as they who have their sight. All she requires of those who play with her, is to name every card as it is played; and these she retains so exactly, that she frequently performs some notable strokes, such as shew a great combination and strong memory. The most wonderful circumstance is, that she should have learned to read and write; but even this is readily believed on knowing her method. In writing to her, no ink is used, but the letters are pricked down on the paper, and by the delicacy of her touch, feeling each letter, she follows them successively, and reads every word with her finger ends. She herself in writing makes use of a pencil, as she could not know when her pen was dry; her guide on the paper is a small thin ruler, and of the breadth of the writing. On finishing a letter, she wets it, so as to fix the traces of her pencil, that they are not obscured or effaced; then proceeds to fold and seal it, and write the direction; all by her own address, and without the assistance of any other person. Her writing is very straight, well cut, and the spelling no less correct. To reach this singular mechanism, the indefatigable cares of her affectionate mother were long employed, who accustomed her daughter to feel letters cut in cards of paste-board, brought her to distinguish an A from a B, and thus the whole alphabet, and afterwards to spell words; then, by

the remembrance of the shape of the letters, to delineate them on paper; and, lastly, to arrange them so as to form words and sentences. She has learned to play on the guitar, and has even contrived a way of pricking down the tunes, as an assistance to her memory. So delicate are her organs, that in singing a tune, though new to her, she is able to name the notes. In figured dances she acquits herself extremely well, and in a minuet, with inimitable ease and gracefulness. As for the works of her sex, she has a masterly hand; she sews and hems perfectly well; and in all her works she threads her needles for herself, however small. By the watch her touch never fails telling her exactly the hour and minute.

Diderot gives a very curious account of a blind lady. It is so remarkable, that we shall distinguish it by the separate title of **WONDERFUL PERFORMANCES OF A FEMALE, BLIND ALMOST FROM INFANCY.**

The name of this remarkable person was, Mademoiselle Melanie de Salignac, a young lady, who had been blind almost from her birth. Her feeling, hearing, and smell, were exquisite. She could distinguish, by the impression of the air, whether it was fine or cloudy, whether she was in an open place or a street, and whether the street was open at the end;—also, whether she was in a room or not, and of what size it was. Having once gone over a house, she became so well acquainted with the different parts, as to be able to warn others of any danger they were exposed to, by the existence of a step, or the lowness of a door. She could thread the smallest needle, with the greatest dexterity; and could execute every sort of needle-work. She played very well at many games at cards, which she distinguished by some little mark, known to herself by the touch, but imperceptible to the sight of any other person. She had learnt, and understood very well, music, geography, geometry, and dancing. She was, indeed, extremely clever; what made her more interesting, she was modest, mild, cheerful, and affectionate. She wrote with a pin, by pricking a sheet of paper, stretched on a frame, and read what she had written, by feeling the pin-marks on the other side of the paper. She could read a book, printed on one side only; some were printed expressly for her, in this manner. In a piece of twelve or fifteen lines, if the number of letters in each word, together with the letter which it began with, was given her, she could tell every word, however oddly composed. "This fact," says Diderot, "was attested by every one of her family, by myself, and twenty other persons, still alive. She died at the age of twenty-two. She was the daughter of Madame de Blacy, a woman distin-

guished for the eminence of her moral qualities," and moving in a respectable sphere of life.—See *Grimm's Memoirs*.

We now proceed to detail the following **WONDERFUL INSTANCES OF ADROITNESS OF PERSONS BORN DEFECTIVE IN THEIR LIMBS.**

Several instances of such births have occurred, and the wonderful acquirements of persons thus maimed by nature have often been the subject of public astonishment, and proved a source of gain to themselves or their relations.

Giraldus Cambriensis speaks of a young woman born without arms, whom he saw at Chester, in the reign of Henry II. He mentions her working very dexterously with her needle.

Stowe gives an account of a Dutchman born without arms, who in 1581, exhibited surprising feats of activity in London; such as flourishing with a rapier, shooting an arrow near a mark, &c.

Bulwer, in his *Artificial Changeling*, speaks of John Simons, a native of Berkshire, born without arms or hands, who could write with his mouth; thread a needle; tie a knot; shuffle, cut, and deal a pack of cards, &c. He was shewn in public in 1653.

John Sear, a Spaniard, born without arms, was shewn in London in King William's reign, who could comb and shave himself, fill a glass, thread a needle, embroider, write six sorts of hands, and play on several instruments of music.

Matthew Buckinger, a German, born without arms or legs, who came to England, wrote a good hand, (many specimens of which are extant,) and performed several wonderful feats. He died in 1722, aged forty-eight.

Thomas Pinnington, a native of Liverpool, born without legs or arms, performed much the same feats as Sear, in 1744, and several years ensuing; since which, a Miss Hawtin, from Coventry, born without arms, and others whose names have not been mentioned, have exhibited themselves at Bartholomew Fair and other places.

Thomas Inglefield, born without arms or legs, at Hook, in Hampshire, (anno 1769) died a few years ago in London. He was not publicly shewn, but got his bread by writing and drawing. There are two portraits of him, one of which was etched by himself.

There was, a short time since, a farmer living at Ditch-heath in Somersetshire, born without arms,—William Kingston, of whom frequent mention has been made in the public papers. He surpasses, according to accounts which seem very well attested, all that have been yet spoken of.

The following account was given a few years since, in the papers, by a person who visited him. "In order to give the

public a satisfactory account of William Kingston," says the writer, "I went to Ditcheat, and the next morning got him to breakfast with me at Mrs. Goodfellow's, and had ocular proof of his dexterity. He highly entertained us at breakfast, by putting his half-naked feet upon the table as he sat, and carrying his tea and toast between his great and second toe to his mouth, with as much facility as if his foot had been a hand, and his toes fingers. I put half a sheet of paper upon the floor, with a pen and ink-horn. He threw off his shoes as he sat, took the ink-horn in the toes of his left foot, and held the pen in those of his right. He then wrote three lines as well as most ordinary writers, and as swiftly. He writes all his own bills and other accounts. He then shewed me how he shaves himself with the razor in his toes; and he can comb his own hair. He can dress and undress himself, except buttoning his clothes. He feeds himself, and can bring both his meat or his broth to his mouth, by holding the fork or spoon in his toes. He cleans his own shoes, lights the fire, and does almost any domestic business as well as any other man. He can make hen-coops. He is a farmer by occupation. He can milk his cows with his toes, and cuts his own hay, binds it up in bundles, and carries it about the field for his cattle. Last winter he had eight heifers constantly to fodder. The last summer he made all his hay-ricks. He can do all the business of the hay-field (except mowing) as fast and as well with his feet as others can with rakes and forks. He goes to the field, and catches his horse. He saddles and bridles him with his teeth and toes. If he has a sheep among his flock that ails any thing, he can separate it from the rest, and drive it into a corner when nobody else can: he then examines it, and applies a remedy to it. He is so strong in his teeth, that he can lift ten pecks of beans with them. He can throw a great sledge-hammer as far with his feet, as other men can with their hands. In a word, he can nearly do as much without as others can with their arms.

"He began the world with a hen and chickens. With the profit on these he procured a ewe. The sale of these procured a ragged colt (as he termed it) and a sheep, and he now occupies a small farm."

"Necessity is the mother of invention." This proverb was never more fully exemplified than in the cases above mentioned. Habit, early acquired and long practised, may render the toes almost as useful as the fingers: the lips are also endowed with acute feeling and great flexibility, and may become powerful assistants where the hands are wanting. One lesson, at least, may be taught by this maimed tribe:—that few things are so difficult, that they cannot be acquired by perseverance and application.

While some persons are noted for their extraordinary and wonderful faculties, others are remarkable for defects in natural capacities. The reader will feel interested in the following CURIOUS ACCOUNT OF INCAPACITY OF DISTINGUISHING COLOURS.

Of this extraordinary defect in vision, we have the following instances in the Philosophical Transactions for 1777. One of the persons lived at Maryport in Cumberland. The account was communicated by Mr. Huddart to Dr. Priestly; and is as follows:—"His name was Harris; by trade a shoe-maker. I had often heard from others that he could discern the form and magnitude of all objects very distinctly, but could not distinguish colours. This report had excited my curiosity; I conversed with him frequently on the subject. The account he gave was this: That he had reason to believe other persons saw something in objects which he could not see; that their language seemed to mark qualities with precision and confidence, which he could only guess at with hesitation, and frequently with error. His first suspicion of this arose when he was about four years old. Having by accident found in the street a child's stocking, he carried it to a neighbouring house to inquire for the owner; he observed the people called it a *red* stocking, though he did not understand why they gave it that denomination, as he himself thought it completely described by being called a *stocking*. This circumstance, however, remained in his memory, and together with subsequent observations, led him to the knowledge of this defect. He also observed, that when young, other children could discern cherries on a tree by some pretended difference of colour, though he could only distinguish them from the leaves, by the difference of their size and shape. He observed also, that by means of this difference of colour they could see the cherries at a greater distance than he could, though he could see other objects at as great a distance as they, that is, where the sight was not assisted by the colour. Large objects he could see as well as other persons; and even the smaller ones, if they were not enveloped in other things, as in the case of cherries among the leaves. I believe he could never do more than guess the name of any colour; yet he could distinguish white from black, or black from any light or bright colour. Dove or straw colour he called *white*, and different colours he frequently called by the same name; yet he could discern a difference between them when placed together. In general, colours of an equal degree of brightness, however they might otherwise differ, he confounded together. Yet a striped ribbon he could distinguish from a plain one; but he could not tell what the colours were with any tolerable exactness. Dark colours, in general, he often mistook for black; but

never imagined white to be a dark colour, nor dark to be a white colour. He was an intelligent man, and very desirous of understanding the nature of light and colours, for which end he had attended a course of lectures in natural philosophy. He had two brothers in the same circumstances as to sight; and two others (brothers and sisters) who, as well as their parents, had nothing of this defect. One of the first mentioned brothers, who is now living, I met with at Dublin, and wished to try his capacity to distinguish the colours in a prism; but not having one by me, I asked him, whether he had ever seen a rainbow? he replied, he had often; and could distinguish the different colours; meaning only, that it was composed of different colours, for he could not tell what they were. I then procured, and shewed him a piece of ribbon. he immediately, and without any difficulty, pronounced it a striped, and not a plain, ribbon. He then attempted to name the different stripes: the several stripes of white he uniformly, and without hesitation, called white: the four black stripes he was deceived in; for three of them he thought brown, though they were exactly of the same shade with the other, which he properly called black. He spoke, however, with diffidence, as to all those stripes; and it must be owned, that the black was not very distinct: the light green he called yellow; but he was not very positive: he said, "I think this what you call yellow." The middle stripe, which had a slight tinge of red, he called a sort of blue. But he was most of all deceived by the orange colour: of this he spoke very confidently, saying, "This is the colour of grass, this is green." I also shewed him a great variety of ribbons, the colour of which he sometimes named rightly, and sometimes as differently as possible from the true colour. I asked him, whether he imagined it possible for all the various colours he saw to be mere difference of light and shade; and that all colours could be composed of these two mixtures only? With some hesitation he replied, No, he did imagine there was some other difference. It is proper to add, that the experiment of the striped ribbon was made in the day-time, and in a good light."

Incredible as the above phenomena may appear, we can add the following fact in confirmation of them, from personal knowledge. There is a gentleman now living in Edinburgh, whose optical nerves have laboured under a defect perfectly similar, since his infancy; but whose powers of vision are in other respects so much superior to those of most other people, that he draws the most striking likenesses, being a limner by profession, and requires for this purpose only once to see the person whose portrait is intended to be drawn, scarcely desiring a single sitting, much less repeated visiting. And what

is still more extraordinary, he can, from such a momentary glance, retain the idea of the features, and even the gait and manner of the person, for years afterwards, so exactly as to be able to finish either a miniature head, or full portrait, at that distant period, as well as if the person were present. His friends, incredulous of this phenomenon, have, by placing his colours out of the order in which he keeps them, sometimes made him give a gentleman a *green beard*, and paint a beautiful young lady with a pair of *blue cheeks*.

We now proceed to the consideration of a very remarkable acquirement of man, called VENTRILLOQUISM.

This is an art of speaking, by means of which the human voice and other sounds are rendered audible, as if they proceeded from several different places; though the utterer does not change his place, and in many instances does not appear to speak. It has been supposed to be a natural peculiarity; because few, if any persons, have learned it by being taught, and we have had no rules laid down for acquiring it. It seems to have been in consequence of this notion, that the name 'Ventriloquism' has been applied to it, from a supposition that the voice proceeds from the thorax or chest. It has seldom been practised but by persons of the lower classes of society; and as it does not seem to present any advantages beyond that of causing surprise and entertainment, and cannot be exhibited on an extended theatre, the probability is, that it will continue amongst them.

Mr. Gough, in his *Manchester Memoirs*, and in various parts of *Nicholson's Journal*, has entertained the opinion that the voice of ventriloquists is made to proceed, in appearance, from different parts of a room, by the management of an echo. But the facts themselves do not support this hypothesis, as a great and sudden variety and change of echoes would be required; and his own judicious remarks, in the same work, on the facility with which we are deceived as to the direction of sound, are adverse to his theory. From numerous attentive observations, it appears manifest that the art is not peculiar to certain individuals, but may with facility be acquired by any person of accurate observation. It consists merely in an imitation of sounds, as they occur in nature, accompanied with appropriate action, of such a description as may best concur in leading the minds of the observers to favour the deception.

Any one who shall try, will be a little surprised to find how easy it is to imitate the noise made by a saw, or by a snuff-box when opened and shut, or by a large hand-bell, or cork-cutter's knife, a watch while going, and numberless other inanimate objects; or the voices of animals, in their various

situations and necessities, such as a cat, a dog, or an hen enraged, intimidated, confined, &c.; or to vary the character of the human voice by shrillness or depth of tone, rapidity or drawling of execution, and distinctness or imperfection of articulation, which may be instantly changed by holding the mouth a little more opened or more closed than usual, altering the position of the jaw, keeping the tongue in any determinate situation, &c. And every one of the imitations of the ventriloquist will be rendered more perfect by practising them at the very time the sounds are heard, instead of depending on the memory. The leading condition of performance is, that the voices and sounds of the dramatic dialogue to be exhibited, should succeed each other so rapidly that the audience should lose sight of the probability that one actor gives effect to the whole, and that where the business is simple, the aid of scenery or local circumstance should be called in.

We have seen an eminent philosopher of our own time, who had no previous practice of this art, but when speaking on the subject in a mixed company, took up a hat, and folding the flaps together, said, by way of example, "Suppose I had a small monkey in this hat;" and then cautiously putting his hand in, as if to catch it, he imitated the chatter of the supposed struggling animal, at the same time that his own efforts to secure it had a momentary impression on the spectators, which left no time to question whether there was a monkey in it or not: this impression was completed when, the instant afterwards, he pulled out his hand as if hurt, and exclaimed, "He has bit me!" It was not till then that the impression of the reality gave way to the diversion arising from the mimic art; and one of the company, even then, cried out, "Is there really a monkey in the hat?"

In this manner it was that, at the beginning of the last century, the famous Tom King, who is said to have been the first man who delivered public lectures on experimental philosophy in the country, was attended by the whole fashionable world, for a succession of many nights, to hear him "kill a calf." This performance was done in a separated part of the place of exhibition, into which the exhibiter retired alone; and the imagination of his polite hearers was taxed to supply the calf and three butchers, besides a dog who sometimes raised his voice, and was checked for his unnecessary exertions. It appears, from traditional narrative, that the calf was heard to be dragged in, not without some efforts and conversation on the part of the butchers, and noisy resistance from the calf; that they conversed on the qualities of the animal, and the profits to be expected from the veal; and that, as they proceeded, all the noises of knife and steel, of suspending the creature, and of the last fatal

catastrophe, were heard in rapid succession, to the never-failing satisfaction of the attendants; who, upon the rise of the curtain, saw that all these imaginary personages had vanished, and Tom King alone remained to claim the applause.

A similar fact may be quoted in the person of that facetious gentleman, who has assumed and given celebrity to the name of Peter Pindar. This great poet, laughing at the proverbial poverty of his profession, is sometimes pleased to entertain his friends with singular effusions of the art we speak of. One of these is managed by a messenger announcing to the Doctor (in the midst of company) that a person wants to speak with him: he accordingly goes out, leaving the door ajar, and immediately a female voice is heard, which, from the nature of the subject, appears to be that of the Poet's laundress, who complains of her pressing wants, disappointed claims, and of broken promises no longer to be borne with patience. It is more easy to imagine than describe the mixed emotions of the audience. The scene, however, goes on by the Doctor's reply; who remonstrates, promises, and is rather angry at the time and place of this unwelcome visit. His antagonist unfortunately is neither mollified nor disposed to quit her ground. Passion increases on both sides, and the Doctor forgets himself so far as to threaten the irritated female; she defies him, and this last promise, very unlike the former ones, is followed by payment; a severe smack on the face is heard; the poor woman falls down stairs, with horrid outcries; the company, of course, rises in alarm, and the Doctor is found in a state of perfect tranquillity, apparently a stranger to the whole transaction.

A very able ventriloquist, Fitz-James, performed in public, in Soho-square, about four years ago. He personated various characters by appropriate dresses; and by a command of the muscles of his face he could very much alter his appearance. He imitated many inanimate noises, and among others, a repetition of noises of the water machine at Marli. He conversed with some statues, which replied to him; and also with some persons supposed to be in the room above, and on the landing-place; gave the watchman's cry, gradually approaching, and when he seemed opposite the window, Fitz-James opened it and asked what the time was, received the answer, and during his proceeding with his cry, Fitz-James shut the window, immediately upon which the sound became weaker, and at last insensible. In the whole of his performance, it was clear that the notions of the audience were governed by the auxiliary circumstances, as to direction, &c. This mimic had at least, six different habitual modes of speaking, which he could instantly adapt one after the other, and with so much rapidity, that when in a small closet, parted off in the

room, he gave a long, confused, and impassioned debate of democrats (in French, as almost the whole of his performance was;) it seemed to proceed from a multitude of speakers: and an inaccurate observer might have thought that several were speaking at once. A ludicrous scene of drawing a tooth was performed in the same manner.

These examples, and many more which might be added, are sufficient, in proof that ventriloquism is the art of mimicry, an imitation applied to sounds of every description, and attended with circumstances which produce an entertaining deception, and lead the hearers to imagine that the voice proceeds from different situations. When distant low voices are to be imitated, the articulation may be given with sufficient distinctness, without moving the lips, or altering the countenance. It was by a supposed supernatural voice of this kind, from a ventriloquist, that the famous musical small coal man, Thomas Britton, received a warning of his death, which so greatly affected him, that he did not survive the affright.

The following quotation from Richerand's Physiology will be sufficient to give the reader a further idea of the mechanism of this singular art. "At first," says Richerand, "I had conjectured that a great portion of the air driven out by expiration did not pass out by the mouth and nostrils, but was swallowed and carried into the stomach, reflected in some part of the digestive canal, and gave rise to a real echo; but after having attentively observed this curious phenomenon, in Mr. Fitz-James, who represents it in its greatest perfection, I was enabled to convince myself that the name ventriloquism is by no means applicable, since the whole of its mechanism consists in a slow gradual expiration, drawn in such a way that the artist either makes use of the influence exerted by volition over the muscles or parietis of the thorax, or that he keeps the epiglottis down by the base of the tongue, the apex of which is not carried beyond the dental arches.

"He always makes a strong inspiration just before this long expiration, and thus conveys a considerable mass of air into the lungs, the exit of which he afterwards manages with such address. Therefore, repletion of the stomach greatly impedes the talent of Mr. Fitz-James, by preventing the diaphragm from descending sufficiently to admit of a dilatation of the thorax, in proportion to the quantity of air that the lungs should receive. By accelerating or retarding the exit of the air, he can imitate different voices, and induce his auditors to a belief that the interlocutors of a dialogue, which is kept up by himself alone, are placed at different distances; and this illusion is the more complete in proportion to the perfection of his peculiar talent. No man possesses, to such

a degree as Mr. Fitz-James, the art of deceiving persons who are least liable to delusion, he can carry his execution to five or six different tones, pass rapidly from one to another, as he does when representing an animated dispute in the midst of a popular assembly."

Some persons are of opinion that the witch of Endor was a ventriloquist, and that she practised this art before King Saul, and deceived him in the resurrection of Samuel; the present writer, however, does not vouch for this opinion.

Another very extraordinary acquirement, and which the present writer has been witness to, is, SWORD-SWALLOWING.

This surprising act is performed by the Indian Jugglers; the following account of which, is extracted from Forbes's Oriental Memoirs.

"I have elsewhere mentioned some feats of the Indian Jugglers: at Zinore I saw one which surpassed every thing of the kind I had before witnessed, I mean the swallowing a sword up to the hilt. Had I not afterwards met with the same set on the island of Salsette, exhibiting before the English chief at Tannah, I should have doubted the evidence of my senses. I witnessed the fact more than once, and am convinced there was no deception. Finding my tale generally disbelieved in Europe, I suppressed it; but having since read a clear and satisfactory account of this extraordinary transaction, drawn up by Mr. Johnson, surgeon in the navy, who, in the year 1804, was an eye-witness of this performance, and having described it as a professional man, I shall transcribe the account from his memoir:—

"Having been visited by one of these conjurers, I resolved to see clearly his mode of performing this operation; and for that purpose ordered him to seat himself on the floor of the veranda. The sword he intended to use has some resemblance to a common spit in shape, except at the handle, which is merely a part of the blade itself, rounded and elongated into a little rod. It is from twenty-two to twenty-six inches in length, about an inch in breadth, and about one-fifth of an inch in thickness; the edges and point are blunt, being rounded, and of the same thickness as the rest of the blade; it is of iron or steel, smooth, and a little bright. Having satisfied himself with respect to the sword, by attempting to bend it; and by striking it against a stone, I firmly grasped it by the handle, and ordered him to proceed. He first took a small phial of oil, and with one of his fingers rubbed a little of it over the surface of the instrument; then, stretching up his neck as much as possible, and bending himself a little backwards, he introduced the point of it into his mouth, and pushed it gently down his throat, until my

hand, which was on the handle, came in contact with his lips. He then made a sign to me with one of his hands, to feel the point of the instrument between his breast and navel: which I could do, by bending him a little more backwards, and pressing my fingers on his stomach, he being a very thin and lean fellow. On letting go the handle of the sword, he instantly fixed on it a little machine that spun round, and disengaged a small fire-work, which encircling his head with a blue flame, gave him, as he then sat, a truly diabolical appearance. On withdrawing the instrument, several parts of its surface were covered with blood, which shewed that he was still obliged to use a degree of violence in the introduction.

“I was at first a good deal surprised at this transaction altogether; but when I came to reflect a little upon it, there appeared nothing at all improbable, much less impossible, in the business. He told me, on giving him a trifle, that he had been accustomed, from his early years, to introduce at first small elastic instruments down his throat, and into his stomach; that by degrees he had used larger ones, until at length he was able to use the present iron sword.” *Oriental Memoirs*, vol. ii. pp. 515—517.

Two of these jugglers have lately visited England, and performed the above exploit, with many others, almost equally surprising, to the satisfaction of crowded audiences.

We may learn from various instances in this chapter the value of perseverance; this will overcome difficulties, which at first appear insuperable; and it is amazing to consider, how great and numerous obstacles may be removed by a continual attention to any particular point. By such attention and perseverance, what may not man effect! Any man, unless he be an absolute idiot, may by these means raise himself to excellence in some branch or other; and what is best of all, by divine assistance, and by unwearied and keen application, he may resist temptation, conquer the evil principle, rise superior to all the difficulties and trials of life, excel in wisdom and goodness, and thus be fitted for a better country when death summons him away from the present world.

Man must soar.

An obstinate activity within,
 An insuppressive spring, will toss him up,
 In spite of fortune's load. Not kings alone,
 Each villager has his ambition too;
 No sultan prouder than his fetter'd slave.
 Slaves build their little Babylons of straw,
 Echo the proud Assyrian, in their hearts,
 And cry—"Behold the wonders of my might!"
 And why? Because immortal as their lord;
 And souls immortal must for ever heave
 At something great; the glitter, or the gold;
 The praise of mortals, or the praise of heav'n.

Young.

INDIAN JUGGLERS; (see pages 62 and 63.)—The Indian jugglers, who exhibited in London from 1810 to 1815, performed such astonishing feats, that it would appear to require a long life, spent in incessant practice, to acquire facility in any one of them; such proficiency is so common, however, in India, that it probably excites no extraordinary interest there. The following is a description of their performances, which were witnessed by the editor of this work.

The exhibition takes place upon a raised platform, on which, having performed his salaam, or eastern obeisance, the chief performer takes his seat; and behind him sits the second juggler, and an attendant boy, whose occupation is to beat together two metallic plates, somewhat resembling cymbals, which emit an unremitting sound, like the clucking of a hen.

The first tricks are performed with cups and balls. These are similar in their mode to the deceptions of our own conjurers, and only remarkable for the superiority of their evolutions in the hands of this celebrated Asiatic. The cups seem enchanted; the balls fly; they increase in number; they diminish; now one, now two, now none under the cup; and now the serpent, the *cobra de capella*, usurps the place of a small globule of cork, and winds its snaky folds as if from under the puny vessel. The facility with which this dexterous feat is accomplished, gives life and animation to the sable countenance of the artist, whose arm is bared to the elbow, to shew that the whole is done by sleight of hand. During his performances, the juggler keeps up an unremitting noise, striking his tongue against his teeth, like the clack of machinery, and uttering sounds, as if he were repeating, with inconceivable rapidity, the words "*Crickery-tick, crickery-tick, crickery-tick, a-tow, geret-tow, crickery-tick, a-tow, &c.*"

The next feat is that of breaking a cotton thread into the consistency of scraped lint, as used by surgeons, and reproducing it continued and entire; after which he lays upon the palm of his hand a small quantity of common sand; this he rubs with the fingers of his other hand, and it changes its hue—the colourless grains become yellow; he rubs them again, they are white; again, and they are black.

A series of evolutions then succeeds, with four hollow brass balls, about the size of oranges. His power over these is almost miraculous. He causes them to describe every possible circle—horizontally, perpendicularly, obliquely, transversely, round his legs, under his arms, about his head, in small and in large circumferences—with wondrous rapidity, and keeping the whole number in motion at the same time. This being the sole fruit of effort, activity, quickness of eye, and rapidity of action, no one who has not witnessed it can form an idea of its excellence. He then exhibits his astonishing power

of balancing. He places on his two great toes (over which he seems to have the same command that less favoured whites enjoy over their fingers only) a couple of thin rings, of about four inches in diameter; a pair of similar rings he places on his fore fingers, and then he sets the whole into rotation, and round they all whirl, and continue describing their orbits without cessation, as if set to work by machinery, endowed with the principle of perpetual motion.

CHAP. IV.

Extraordinary Fasting—Wonders of Abstinence—Sleep-walking—Sleeping Woman of Dunninald—Instances of Extraordinary Dreams—Poetical, Grammatical, and Scientific Deaths—Anthropophagi, or Men-Eaters—Wild Man.

EXTRAORDINARY INSTANCES OF FASTING.

A full account of a very uncommon case is given in the Phil. Trans. vol. lxvii. part I. *Janet M'Leod*, an inhabitant in the parish of Kincardine, in Ross-shire, continued healthy till she was fifteen years of age, when she had a pretty severe epileptic fit; after this she had an interval of health for four years, and then another epileptic fit, which continued a whole day and a night. A few days afterwards she was seized with a fever, which continued with violence several weeks, and from which she did not perfectly recover for some months. At this time she lost the use of her eyelids; so that she was under the necessity of keeping them open with the fingers of one hand, whenever she wanted to look about her. In other respects she continued in pretty good health; only she periodically spit up blood in pretty large quantities, and at the same time it flowed from the nose. This discharge continued several years; but at last it ceased; and soon after she had a third epileptic fit, and after that a fever, from which she recovered slowly. Six weeks after the crisis, she stole out of the house unknown to her parents, who were busied in their harvest work, and bound the sheaves of a ridge before she was observed. In the evening she took to her bed, complaining much of her *heart* (probably meaning her *stomach*) and her head. From that time she never rose for five years, but was occasionally lifted out of bed. She seldom spoke a word, and took so little food, that it seemed scarcely sufficient to support a sucking infant. Even this small quantity was taken by compulsion; and at last, about Whitsunday, 1763, she totally refused every kind of food or drink. Her jaws now became so fast locked, that it was with the greatest difficulty her father was able to open her teeth a little, in order to admit a small quantity of gruel or whey, but of this so much generally run out at the corners of her mouth, that they could not be sensible any had been swal-

lowed. About this time they got some water from a noted medical spring in Brae-Mar, some of which they attempted to make her swallow, but without effect. They continued their trials, however, for three mornings; rubbing her throat with the water which ran out at the corners of her mouth. On the third morning, during the operation, she cried out, "Give me more water; and swallowed with ease all that remained in the bottle. She spoke no more intelligibly for a year, though she continued to mutter some words, for 14 days, which her parents only understood. She continued to reject all kinds of food and drink till July, 1765. At this time her sister thought, by some signs she made, that she wanted her jaws opened; and this being done, not without violence, she called intelligibly for some liquid, and drank with ease about an English pint of water. Her father then asked why she would not make some signs when she wanted to drink? To which she answered,—why should she, when she had no desire? It was now supposed that she had regained the faculty of speech; and her jaws were kept open for about three weeks, by means of a wedge. But in four or five days she became totally silent, and the wedge was removed, because it made her lips sore. She still, however, continued sensible; and when her eyelids were opened, knew every body. This could be guessed from the signs she made. By continuing their attempts to force open her jaws, two of the under fore teeth were driven out; and of this opening her parents endeavoured to avail themselves, by putting some thin nourishing drink into her mouth, but without effect, as it always returned by the corners. Sometimes they thought of thrusting a little dough of oatmeal through this gap of the teeth, which she would retain a few seconds, and then return with something like a straining to vomit, without one particle going down. Nor were the family sensible of any thing like swallowing for four years, excepting the small draught of Brae-Mar water, and an English pint of common water. For the last three years she had no natural discharge, except that once or twice a week she passed a few drops of water.

In this situation she was visited by Dr. Mackenzie, who communicated the account to the Royal Society. He found her not at all emaciated; her knees were bent, and the hamstrings tight, so that her heels were drawn up behind her body. She slept much, and was very quiet; but when awake, kept a constant whimpering like a new-born weakly infant. She never could remain a moment on her back, but always fell to one side or another; and her chin was drawn close to her breast, nor could it by any force be moved backwards. The Doctor paid his first visit in October, 1767; and five years afterwards, viz, in October, 1772, was induced to pay

her a second visit, by hearing that she was recovering, and had begun to eat and drink. The account given him was most extraordinary.

Her parents one day returning from their country labours, (having left their daughter fixed to her bed as usual,) were greatly surprised to find her sitting upon her hams, in a part of the house opposite to her bed-place, spinning with her mother's distaff. All the food she took at that time was only to crumble a little oat or barley cake in the palm of her hand, as if to feed a chicken. She put little crumbs of this into the gap of her teeth; rolled them about for some time in her mouth; and then sucked out of the palm of her hand a little water, whey, or milk; and this only once or twice a day, and even that by compulsion. She never attempted to speak; her jaws were fast locked, and her eyes shut. On opening her eyelids; the balls were found to be turned up under the edge of the os frontis; her countenance was ghastly, her complexion pale, and her whole person emaciated. She seemed sensible and tractable, except in taking food. This she did with the utmost reluctance, and even cried before she yielded. The great change of her looks, Dr. Mackenzie attributed to her spinning flax on the distaff, which exhausted too much of the saliva; and therefore he recommended to her parents to confine her totally to the spinning of wool. In 1775, she was visited again, and found to be greatly improved in her looks as well as strength; her food was also considerably increased in quantity; though even then she did not take more than would be sufficient to sustain an infant of two years of age.

In the *Gentleman's Magazine*, for 1789, p. 1211, is recorded the death of one Caleb Elliot, a visionary enthusiast, who meant to have fasted 40 days, and actually survived 16 without food, having obstinately refused sustenance of every kind.

At the same time that we should guard against superstitious fasting, we should be cautious not to transgress the bounds of temperance. Occasional abstinence is useful and praiseworthy, and we shall now give some instances of **THE WONDERS OF ABSTINENCE.**

Many wonders are related of the effects of abstinence, in the cure of several disorders, and in protracting the term of life. The noble Venetian, Cornaro, after all imaginable means had proved vain, so that his life was despaired of at 40, recovered, and lived to near 100, by mere dint of abstinence; as he himself gives account. It is indeed surprising to what a great age the primitive Christians of the East, who retired from the persecutions into the deserts of Arabia and

Egypt, lived, healthful and cheerful, on a very little food. Cassian assures us, that the common rate for 24 hours was 12 ounces of bread, and mere water; with this, St. Anthony lived 105 years; James the hermit, 104; Arsenius, tutor of the Emperor Arcadius, 123; S. Epiphanius, 115; Simeon, the Stylite, 112; and Romauld, 130. Indeed, we can match these instances of longevity at home. Buchanan writes, that one Lawrence preserved himself to 140, by force of temperance and labour; and Spottiswood mentions one Kentigern, afterwards called St. Mongah, or Mungo, who lived to 185, by the same means. Abstinence, however, is to be recommended only as it means a proper regimen; for in general it must have bad consequences, when observed without a due regard to constitution, age, strength, &c.

According to Dr. Cheyne, most of the chronical diseases, the infirmities of old age, and the short lives of Englishmen, are owing to repletion; and may be either cured, prevented, or remedied, by abstinence: but then the kinds of abstinence which ought to obtain, either in sickness or health, are to be deduced from the laws of diet and regimen. Among the brute creation, we see extraordinary instances of long abstinence. The serpent kind, in particular, bear abstinence to a wonderful degree. Rattlesnakes are reported to have subsisted many months without any food, yet still retained their vigour and fierceness. Dr. Shaw speaks of a couple of cerastes, (a sort of Egyptian serpents,) which had been kept five years in a bottle close corked, without any sort of food, unless a small quantity of sand, wherein they coiled themselves up in the bottom of the vessel, may be reckoned as such: yet when he saw them, they had newly cast their skins, and were as brisk and lively as if just taken.

But it is even natural for divers species of creatures to pass four, five, or six months' every year, without either eating or drinking. Accordingly, the tortoise, bear, dormouse, serpent, &c. are observed regularly to retire, at those seasons, to their respective cells, and hide themselves,—some in the caverns of rocks or ruins; others dig holes under ground, others get into woods, and lay themselves up in clefts of trees; others bury themselves under water, &c. And yet these animals are found as fat and fleshy after some months' abstinence as before.—A gentleman (*Phil. Trans.* No. 194.) weighed his tortoise several years successively, at its going to earth in October, and coming out again in March; and found that, of four pounds four ounces, it only used to lose about one ounce.—Indeed, we have instances of men passing several months as strictly abstinent as other creatures. In particular, the records of the Tower mention a Scotchman imprisoned for felony, and strictly watched in that fortress

for six weeks ; in all which time he took not the least sustenance ; for which he had his pardon. Numberless instances of extraordinary abstinence, particularly from morbid causes, are to be found in the different periodical Memoirs, Transactions, Ephemerides, &c. It is to be added, that, in most instances of extraordinary human abstinence related by naturalists, there were said to have been apparent marks of a texture of blood and humour, much like that of the animals above mentioned ; though it is not an improbable opinion that the air itself may furnish something for nutrition. It is certain, there are substances of all kinds, animal, vegetable, &c. floating in the atmosphere, which must be continually taken in by respiration. And that an animal body may be nourished thereby, is evident from the instance of vipers, which, if taken when first brought forth, and kept from every thing but air, will yet grow very considerably in a few days. The eggs of lizards, also, are observed to increase in bulk after they are produced, though there be nothing to furnish the increment but air alone, in like manner as the eggs or spawn of fish grow and are nourished by the water. And hence, say some, it is, that cooks, turnspit dogs, &c. though they eat but little, yet are usually fat.

We shall next offer the reader a few remarks on **SLEEP-WALKING**.

Many instances are related of persons who were addicted to this practice. A very remarkable one has been published from a report made to the Physical Society of Lausanne, by a committee of gentlemen appointed to examine a young man who was accustomed to walk in his sleep.

The disposition to sleep-walking seems, in the opinion of this committee, to depend on a particular affection of the nerves, which both seizes and quits the patient during sleep. Under the influence of this affection, the imagination represents to him the objects that struck him while awake, with as much force as if they really affected his senses ; but it does not make him perceive any of those that are actually presented to his senses, except in so far as they are connected with the dreams which engross him at the time. If, during this state, the imagination has no determined purpose, he receives the impression of objects as if he were awake ; only, however, when the imagination is excited to bend its attention towards them. The perceptions obtained in this state are very accurate, and, when once received, the imagination renews them occasionally with as much force as if they were again acquired by means of the senses. Lastly, these academicians suppose, that the impressions received during this state of the senses, disappear entirely when the person

awakes, and do not return till the recurrence of the same disposition in the nervous system.

Our next article is, A CURIOUS ACCOUNT OF THE SLEEPING WOMAN OF DUNNINALD, NEAR MONTROSE.

The following narrative was communicated to the Royal Society of Edinburgh, by Dr. Brewster.

Margaret Lyall, aged 21, daughter of John Lyall, labourer at Dunninald, was first seized with a sleeping fit on the 27th of June, 1815, which continued to the 30th of June; next morning she was again found in a deep sleep: in this state she remained for seven days, without motion, food, or the use of any animal function. But at the end of this time, by the moving of her left hand, and by plucking at the coverlet of the bed and pointing to her mouth, a wish for food being understood, it was given her. This she took; but still remained in her lethargic state till Tuesday the 8th of August, being six weeks from the time she was seized with the lethargy, without appearing to be awake, except on the afternoon of Friday the 30th of June. During the first two weeks, her pulse was generally about 50, the third week about 60, and previous to her recovery, at 70 to 72. Though extremely feeble for some days after her recovery, she gained strength so rapidly, that before the end of August, she began to work at the harvest, on the lands of Mr. Arkley, and continued without inconvenience to perform her labour.

The account is drawn up by the clergyman of the parish, and is accompanied with the medical report of the surgeons who attended; to whose attestations are added those of Mr. Arkley, the proprietor of Dunninald, and Lyall, the father; and the statement is, in every respect, entitled to the fullest credit.

We shall proceed to some INSTANCES OF EXTRAORDINARY DREAMS.

The following account is by no means intended either to restore the reign of superstition, or to induce the reader to put faith in the numberless ridiculous interpretations, given by some pretenders to divination, of the ordinary run of dreams. The absurdity of the many traditional rules, laid down by such persons; such as, that dreaming of eggs prognosticates *anger*; of the *washing* of linens, forebodes *fitting*; of green fields, *sickness*; of hanging, *honour*; of death, *marriage*; of fish, *children*; and of raw flesh, *death*, &c. &c. can only be exceeded by the folly of those who put faith in such fooleries. But instances have occurred of particular persons, whose veracity cannot be doubted, having dreams of so singular a nature, and so literally and exactly fulfilled, that it

may be well to mention one or two of them, for the entertainment, at least, of the reader, if they should not contribute to his improvement.—

Mr. Richard Boyle, manufacturer, residing in Stirling, about 1781, dreamed that he saw a beautiful young woman, with a winding sheet over her arm, whose image made a deep impression on his mind. Upon telling his mother the dream, she said, you will probably marry that woman, and if you do, she will bury you. Going to Glasgow in 1783, he met with a young woman in a friend's house, exactly resembling the person he had dreamed of; and notwithstanding the disheartening interpretation he had got, and the additional discouraging circumstance told him, that she was already engaged with another young man, was sure she was to be his wife, and did not give up his pursuit till he made her his own. The melancholy part of his dream was soon fulfilled. He lived only 15 months with her; a short, but happy period. His widow, during his life, dreamed with equal exactness of her second husband, whom she did not see till three years afterwards, when the sight of him, at church, in Montrose, disturbed her devotion so much, upon recollecting her dream, that she hardly knew a word the minister said afterwards. Within less than two months, they were introduced to each other; and within four, were married.—Another young lady had dreamed so often, and so particularly, about the gentleman who afterwards married her, that at their first meeting, she started back, as if she had seen a ghost.—The editors of the *Encyclopedia Perthensis* declare they knew the parties concerned in the foregoing relations. But these instances of prophetic dreams, they observe, are trifling, compared to one narrated in the *Weekly Mirror*, printed at Edinburgh, in 1781, and signed *Verax*; and which, they say, they quote the more readily, as also, from personal acquaintance with the parties, they know the narrative to be true:

‘ In June, 1752, Mr. Robert Aikenhead, farmer, in Denstrath, of Arnhall, in the Mearns, about 5 miles north of Brechin, and 7 from Montrose, went to a market called *Tarrenty-fair*, where he had a large sum of money to receive. His eldest son, Robert, a boy about 8 years of age, was sent to take care of the cattle, and, happening to lie down upon a grassy bank before sun-set, fell fast asleep. Although the boy had never been far from home, he was immediately carried in his imagination to Tarrenty market, where, he dreamed, that his father, after receiving the money, set out on his return home, and was followed all the way by two ill-looking fellows, who, when he had got to the western dykes of Ingalls-Maully, (the seat of the then Lord Halkerton, afterwards Earl of Kintore,) and little more than a mile from home,

attacked and attempted to rob him. Whereupon the boy thought he ran to his assistance, and, when he came within a gun-shot of the place, called out some people, who were just going to bed, who put the robbers to flight. He immediately awoke in a fright, and, without waiting to consider whether it was a vision or a reality, ran as fast as he could to the place he had dreamed of, and had no sooner reached it, than he saw his father in the very spot and situation he had seen, in his dream, defending himself with his stick against the assassins. He therefore immediately realized his own part of the visionary scene, by roaring out, *Murder!* which soon brought out the people, who running up to Mr. Aikenhead's assistance, found him victor over one of the villains, whom he had previously knocked down with a stone, after they had pulled him off his horse; but almost overpowered by the other, who repeatedly attempted to stab him with a sword, against which he had no other defence than his stick and his hands, which were considerably mangled by grasping the blade. Upon sight of the country people, the villain who had the sword ran off; but the other not being able, was apprehended and lodged in gaol. Meantime there was no small hue and cry after young Robert, whose mother missing him, and finding the cattle among the corn, was in the utmost anxiety, concluding that he had fallen into some water or peat moss. But her joy and surprise were equally great, when her husband returned with the boy, and told her how miraculously both his money and life had been preserved by his son's dream; although she was at first startled at seeing her husband's hands bloody.

"To those who deny the existence of a God, (adds the writer,) or the superintendence of a divine providence, the above narrative will appear as fabulous as any story in Ovid. To those who measure the greatness and littleness of events by the arbitrary rules of human pride and vanity, it will perhaps appear incredible that such a miracle should have been wrought for the preservation of the life of a country farmer. But all who found their opinions upon the unerring rule of right and truth, which assures us that a sparrow cannot fall to the ground without the permission of our heavenly Father, (and who know, that in the sight of Him, with whom there is no respect of persons or dignities, the life of the greatest monarch on earth, and that of the lowest of his subjects, are of equal value,) will laugh at such silly objections, when opposed to well-attested facts. That the above is one, could be attested upon oath, were it necessary, by Mr. and Mrs. Aikenhead, from whom I had all the particulars above narrated about 15 months ago.—Edinburgh, March 12, 1781."—Indeed, whoever can persuade himself that such facts as

are stated above, can happen by chance, may easily adopt the system of those philosophers, who tell us that the universe was formed by the fortuitous concourse of atoms.

The title of our next subject is curious.—POETICAL, GRAMMATICAL, AND SCIENTIFIC DEATHS.

The Emperor Adrian, dying, made that celebrated address to his soul, which is so happily translated by Pope, in the following words :

Vital spark of heav'nly flame,
Quit, oh quit this mortal frame.
Trembling, hoping, ling'ring, flying,
Oh the pain, the bliss of dying !
Cease, fond Nature, cease thy strife,
And let me languish into life.

Hark ! they whisper ; angels say,
Sister spirit, come away.
What is this absorbs me quite ?
Steals my senses, shuts my sight ?
Drowns my spirits, draws my breath ?
Tell me, my soul, can this be death ?

The world recedes ; it disappears !
Heav'n opens on my eyes ! my ears
With sounds seraphic ring :
Lend, lend your wings ! I mount ! I fly !
O Grave ! where is thy victory ?
O Death ! where is thy sting ?

Lucan, when he had his veins opened by order of Nero, expired reciting a passage from his *Pharsalia*, in which he has described the wound of a dying soldier. Petronius did the same thing on the same occasion.

Patris, a poet of Caen, perceiving himself expiring, composed some verses which are justly admired. In this little poem he relates a dream, in which he appeared to be placed next to a beggar, when, having addressed him in the haughty strain he would probably have employed on this side of the grave, he received the following reprimand :

" Here all are equal ; now thy lot is mine !
" I on my dunghill, as thou art on thine."

Des Barreaux, it is said, wrote, on his death-bed, that sonnet which is well known, and which is translated in the "Spectator."

Margaret of Austria, when she was nearly perishing in a storm at sea, composed for herself the following epitaph in verse :

" Beneath this tomb is high-born Margaret laid,
" Who had two husbands, and yet died a maid."

She was betrothed to Charles VIII. of France, who forsook her. Being next intended for the Spanish Infant, in her voyage to Spain she wrote these lines in a storm.

Roscommon, at the moment he expired, with an energy of voice (says his biographer) that expressed the most fervent devotion, uttered two lines of his own version of "Dies Ira!"

Waller, in his last moments, repeated some lines from Virgil: and Chaucer took his farewell of all human vanities by a moral ode, entitled, "A ballad made by Geffrey Chauncer upon his dethe-bedde lying in his grete anguysses."

"The muse that has attended my course (says the dying Gleim, in a letter to Klopstock*) still hovers round my steps to the very verge of the grave." A collection of songs, composed by old Gleim on his death-bed, it is said, were intended to be published.

Chatellard, a French gentleman, beheaded in Scotland, for having loved the Queen, and even for having attempted her honour, Brantome says, would not have any other viaticum than a poem of Ronsard. When he ascended the scaffold, he took the hymns of this poet, and for his consolation read that on death; which, he says, is well adapted to conquer its fear. He preferred the poems of Ronsard to either a prayer-book or his confessor: such was his passion.

The Marquis of Montrose, when he was condemned by his judges to have his limbs nailed to the gates of four cities, the brave soldier said that, "he was sorry he had not limbs sufficient to be nailed to all the gates of the cities in Europe, as monuments of his loyalty. As he proceeded to his execution, he put this thought into beautiful verse.

Philip Strozzi, when imprisoned by Cosmo the First, great Duke of Tuscany, was apprehensive of the danger to which he might expose his friends, (who had joined in his conspiracy against the duke,) from the confessions which the rack might extort from him. Having attempted every exertion for the liberty of his country, he considered it no crime therefore to die. He resolved on suicide. With the point of the sword, with which he killed himself, he first engraved on the mantle-piece of the chimney, this verse of Virgil:

Exoriare aliquis nostris ex ossibus ultor.

Rise, some avenger, from our blood!

Such persons realize that beautiful fiction of the ancients, who represent the swans of Cayster singing at their death; and have been compared to the nightingale singing with a thorn on its breast.

The following anecdotes are of a different complexion: they may perhaps excite a smile. We have given them the title of GRAMMATICAL DEATHS.

Pere Bouhours was a French grammarian, who had been justly accused of paying too scrupulous an attention to the

* Klopstock's Death in "L'Allemagne;" vol. i. p. 252.

minutiæ of letters. He was more solicitous of his *words* than his *thoughts*. It is said, that when he was dying, he called out to his friends (a correct grammarian to the last,) "*Je Vas, ou je Vais mourir; l'un ou l'autre se dit!*"

When Malherbe was dying, he reprimanded his nurse for making use of a solecism in her language! And when his confessor represented to him the felicities of a future state in low expressions, the dying critic interrupted him: "Hold your tongue," he said, "your wretched style only makes me out of conceit with them!"

Several persons of science have died in a scientific manner.—Haller, the greatest of physicians, beheld his end approach with the utmost composure. He kept feeling his pulse to the last moment, and when he found that life was almost gone, he turned to his brother physician, and observed, "My friend, the artery ceases to beat,"—and almost instantly expired.

De Lagny, who was intended by his friends for the study of the law, having fallen on an Euclid, found it so congenial to his disposition, that he devoted himself to mathematics. In his last moments, when he retained no further recollection of the friends who surrounded his bed, one of them, perhaps to make a philosophical experiment, thought proper to ask him the square of 12; the dying mathematician instantly, and perhaps without knowing that he answered it, replied, "144."

The following lines, from the pen of Mrs. Barbauld, in an address to the Deity, express the desires and hopes of a real Christian in the contemplation of death:

"O when the last, the closing hour draws nigh,
And earth recedes before my swimming eye;
When trembling on the doubtful edge of fate,
I stand, and stretch my view to either state;
Teach me to quit this transitory scene
With decent triumph and a look serene;
Teach me to fix my ardent hopes on high,
And, having liv'd to thee, in thee to die!"

The following article is not of a pleasing description, but nevertheless proper to be inserted in "The Book of Curiosities." It is ANTHROPOPHAGI, OR MEN-EATERS:

The Cyclops, the Lestrygons, and Scylla, are all represented in Homer as Anthropophagi, or man-eaters, and the female phantoms, Circe and the Syrens, first bewitched with a show of pleasure, and then destroyed. This, like the other parts of Homer's poetry, had a foundation in the manners of the times preceding his own. It was still in many places the age spoken of by Orpheus,

"When men devour'd each other like the beasts,
Gorging on human flesh."

History gives us divers instances of persons driven by excess of hunger to eat their own relations. And also out of revenge and hatred, where soldiers, in the heat of battle, have been known to be carried to such an excess of rage, as to tear their enemies with their teeth.

The violence of love has sometimes produced the same effect as the excess of hatred.

Among the Essedonian Scythians, when a man's father died, his neighbours brought him several beasts, which they killed, mixed up their flesh with that of the deceased, and made a feast.

Among the Massageti, when any person grew old, they killed him, and ate his flesh; but if the party died of sickness, they buried him, esteeming him unhappy.

Idolatry and superstition have caused the eating more human flesh, than both love and hatred put together.

There are few nations but have offered human victims to their deities; and it was an established custom to eat part of the sacrifices they offered.

It appears pretty certain, from Dr. Hawkesworth's account of the voyages to the South Seas, that the inhabitants of New Zealand ate the bodies of their enemies. Mr. Petit has a learned dissertation on the nature and manners of the Anthropophagi. Among other things, he disputes whether or no the Anthropophagi act contrary to nature? The philosophers, Diogenes, Chrysippus, and Zeno, followed by the whole body of Stoics, held it a very reasonable thing for men to eat each other.

According to Sextus Empiricus, the first laws were those made to prevent men from eating each other, as had been done until that time.

The Greek writers represent Anthropophagi as universal before Orpheus.

Leonardus Florentinus informs us, that having fed a hog with hog's flesh, and a dog with dog's flesh, he found a repugnance in nature to such food; the former lost all his bristles; the latter its hair, and the whole body broke out in blotches.

If even this horrid practice of eating human flesh originates from hunger, still it must be perpetuated from revenge: as death must lose much of its horror among those who are accustomed to eat the dead; and where there is little horror at the sight of death, there must be less repugnance to murder.

We shall conclude this chapter with AN ACCOUNT OF A WILD MAN, given by M. Le Roy.

In 1774, a wild man was discovered in the neighbourhood of Yuary. This man, who inhabited the rocks near a forest, was very tall, covered with hair like a bear, very nimble, and of a gay humour. He neither did, nor seemed to intend, harm

to any body. He often visited the cottages, without ever attempting to carry off any thing. He had no knowledge of bread, milk, or cheese. His greatest amusement was to see the sheep running, and to scatter them; and he testified his pleasure at this sight by loud fits of laughter, but never attempted to hurt them. When the shepherds (as was frequently the case) let loose their dogs at him, he fled with the swiftness of an arrow, and never allowed the dogs to come too near him. One morning he came to the cottage of some workmen, and one of them endeavouring to catch him by the leg, he laughed heartily, and then made his escape. He seemed to be about thirty years of age. As the forest is very extensive, and had a communication with a vast wood that belongs to the Spanish territories, it is natural to suppose that this solitary, but cheerful creature, had been lost in his infancy, and subsisted on herbs



CHAP. V.

CURIOSITIES RESPECTING MAN.—(Continued.)

Striking Instances of Integrity—Shocking Instances of Ingratitude—Extraordinary Instances of Honour—Surprising Effects of Anger—Remarkable Effects of Fright, or Terror—Notable Instance of the Power of Conscience.

STRIKING INSTANCES OF INTEGRITY.

A MAN of integrity will never listen to any reason, or give way to any measure, or be misled by any inducement, against conscience. The inhabitants of a great town offered Marshal de Turenne 100,000 crowns, upon condition he would take another road, and not march his troops their way. He answered them, "As your town is not on the road I intend to march, I cannot accept the money you offer me."—The Earl of Derby, in the reign of Edward III. making a descent in Guienne, carried by storm the town of Bergerac, and gave it up to be plundered.—A Welsh Knight happening to light upon the receiver's office, found such a quantity of money, that he thought himself obliged to acquaint his general with it, imagining that so great a booty belonged to him. But he was agreeably surprised, when the Earl wished him joy of his good fortune, and said he did not make the keeping of his word depend on the great or little value of what he had promised.—In the siege of Falisci, by Camillus, General of the Romans, the schoolmaster of the town, who had the children of the senators under his care, led them abroad, under the pretext of recreation, and carried them to the Roman

camp; saying to Camillus, that, by this artifice, he had delivered Falisci into his hands. Camillus, abhorring his treachery, said, "That there were laws for war as well as for peace; and that the Romans were taught to make war with integrity, not less than with courage." He ordered the schoolmaster to be stripped, his hands to be bound behind his back, and to be delivered to the boys, to be lashed back into the town. The Falerians, hitherto obstinate in resistance, struck with an act of justice so illustrious, delivered themselves up to the Romans; convinced that they would be far better to have the Romans for their allies, than their enemies.

SHOCKING INSTANCES OF INGRATITUDE.—Herodotus informs us, that when Xerxes, king of Persia, was at Celene, a city of Phrygia, Pythius, a Lydian, who resided there, and, next to Xerxes, was the most opulent prince of those times, entertained him and his whole army with an incredible magnificence, and made him an offer of all his wealth towards defraying the expenses of his expedition. Xerxes, surprised at so generous an offer, inquired to what sum his riches amounted. Pythius answered, that having the design of offering them to his service, he had taken an exact account of them, and that the silver he had by him, amounted to 2000 talents, (about £255,000 sterling), and the gold to 3,993,000 darics (about £1,700,000 sterling). All this money he offered him, telling him, that his revenue was sufficient for the support of his household. Xerxes made him very hearty acknowledgments, and entered into a particular friendship with him, and declined accepting his present. Some time after this, Pythius having desired a favour of him, that out of his five sons, who served in his army, he would be pleased to leave him the eldest, to comfort him in his old age; Xerxes was so enraged at the proposal, though so reasonable in itself, that he caused the eldest son to be killed before his father's eyes, giving the latter to understand, that it was a favour he spared him and the rest of his children. Yet, this is the same Xerxes who is so much admired for his humane reflection at the head of his numerous army.—The emperor Basilus I. exercised himself in hunting: a great stag running furiously against him, fastened one of the branches of his horns in the emperor's girdle, and, pulling him from his horse, dragged him a good distance, to the imminent danger of his life; which a gentleman of his retinue perceiving, drew his sword, and cut the emperor's girdle asunder, which disengaged him from the beast, with little or no hurt to his person. But, observe his reward! "He was sentenced to lose his head for putting the sword so near the body of the emperor; and suffered death accordingly." (*Zonor.*

Annal. tom. 3. p. 155.)—In a little work entitled *Friendly Cautions to Officers*, the following atrocious instance is related. An opulent city, in the west of England, had a regiment sent to be quartered there: the principal inhabitants, glad to shew their hospitality and attachment to their sovereign, got acquainted with the officers, invited them to their houses, and shewed them every civility in their power. A merchant, extremely easy in his circumstances, took so prodigious a liking to one officer in particular, that he gave him an apartment in his own house, and made him in a manner master of it, the officer's friends being always welcome to his table. The merchant was a widower, and had two favourite daughters: the officer cast his wanton eyes upon them, and too fatally ruined them both. Dreadful return to the merchant's misplaced friendship! The consequence of this ungenerous action was, that all officers ever after were shunned as pests to society; nor have the inhabitants yet conquered their aversion to a red coat.—We read in Rapin's History, that during Monmouth's rebellion, in the reign of James II. a certain person, knowing the humane disposition of one Mrs. Gaunt, whose life was one continued exercise of beneficence, fled to her house, where he was concealed and maintained for some time. Hearing, however, of the proclamation, which promised an indemnity and reward to those who discovered such as harboured the rebels, he betrayed his benefactress: and such was the spirit of justice and equity which prevailed among the ministry, that he was pardoned, and recompensed for his treachery, while she was burnt alive for her charity!—The following instance is also to be found in the same history. Humphrey Bannister and his father were both servants to, and raised by, the Duke of Buckingham; who being driven to abscond by an unfortunate accident befalling the army he had raised against the usurper Richard III. he retired to Bannister's house near Shrewsbury, as to a place where he might be quite safe. Bannister, however, upon the king's proclamation promising 1000*l.* reward to him that should apprehend the duke, betrayed his master to John Merton, high sheriff of Shropshire, who sent him under a strong guard to Salisbury, where the king then was; and there, in the market-place, the duke was beheaded. But Divine vengeance pursued the traitor Bannister; for, demanding the 1000*l.* that was the price of his master's blood, Richard refused to pay it him, saying, "He that would be false to so good a master, ought not to be encouraged." He was afterwards hanged for manslaughter; his eldest son went mad, and died in a hog-sty; his second became deformed and lame; and his third son was drowned in a small puddle of water; his eldest daughter became pregnant by one of his carters, and his second was seized with a leprosy whereof she died. *Hist. of*

Eng. i. p. 304. Let us guard against this odious vice, ingratitude, being assured that sooner or later the bitter effects of this, as well as of all other sins, will find us out.

Our following article consists of some EXTRAORDINARY INSTANCES OF HONOUR.

The Spanish historians relate a memorable instance of inviolable regard to the principles of honour and truth. A Spanish cavalier, in a sudden quarrel, slew a Moorish gentleman, and fled. His pursuers soon lost sight of him, for he had, unperceived, leaped over a garden wall. The owner, a Moor, happening to be in his garden, was addressed by the Spaniard on his knees, who acquainted him with his case, and implored concealment. "Eat this," said the Moor (giving him half a peach), "you now know that you may confide in my protection." He then locked him up in his garden, telling him, as soon as it was night he would provide for his escape to a place of greater safety. The Moor then went into his house, where he had but just seated himself, when a great crowd, with loud lamentations, came to his gate, bringing the corpse of his son, who had just been killed by a Spaniard. When the first shock of surprise was a little over, he learned, from the description given, that the fatal deed was done by the very person then in his power. He mentioned this to no one; but, as soon as it was dark, retired to his garden, as if to grieve alone, giving orders that none should follow him. Then accosting the Spaniard, he said, "Christian, the person you have killed is my son, his body is now in my house. You ought to suffer; but you have eaten with me, and I have given you my faith, which must not be broken." He then led the astonished Spaniard to his stables, mounted him on one of his fleetest horses, and said, "Fly far while the night can cover you; you will be safe in the morning. You are indeed guilty of my son's blood; but God is just and good; and thank him, I am innocent of your's, and that my faith given is preserved." This point of honour is most religiously observed by the Arabs and Saracens, from whom it was adopted by the Moors of Africa, and by them was brought into Spain.—The following instance of Spanish honour may still be in the memory of many living, and deserves to be handed down to the latest posterity. In 1746, when Britain was at war with Spain, the Elizabeth of London, captain William Edwards, coming through the gulf from Jamaica, richly laden, met with a most violent storm, in which the ship sprung a leak, that obliged them to run into the Havannah, a Spanish port, to save their lives. The captain went on shore, and directly waited on the governor, told the occasion of his putting in, and that he surrendered the ship as a prize, and himself and his men as prisoners of war, only re-

questing good quarter. "No, Sir," replied the Spanish governor, "if we had taken you in fair war at sea, or approaching our coast with hostile intentions, your ship would then have been a prize, and your people prisoners; but when, distressed by a tempest, you come into our ports for the safety of your lives, we, though enemies, being men, are bound, as such, by the laws of humanity, to afford relief to distressed men who ask it of us. We cannot, even against our enemies, take advantage of an act of God. You have leave therefore to unload your ship, if that be necessary, and to stop the leak; you may refit her here, and traffic so far as shall be necessary to pay the charges; you may then depart, and I will give you a pass to be in force till you are beyond Bermuda: if after that you are taken, you will then be a lawful prize; but now you are only a stranger, and have a stranger's right to safety and protection." The ship accordingly departed, and arrived safe in London.—A remarkable instance of honour is also recorded of an African negro, in captain Snelgrave's account of his voyage to Guinea. A New-England sloop, trading there in 1752, left her second mate, William Murray, sick on shore, and sailed without him. Murray was at the house of a black, named *Cudjoe*, with whom he had contracted an acquaintance during their trade. He recovered; and the sloop being gone, he continued with his black friend till some other opportunity should offer of his getting home. In the mean time a Dutch ship came into the road, and some of the blacks coming on board her, were treacherously seized and carried off as slaves. The relations and friends, transported with sudden rage, ran to the house of *Cudjoe*, to take revenge by killing Murray. *Cudjoe* stopped them at the door, and demanded what they wanted. "The white men," said they, "have carried away our brothers and sons, and we will kill all white men. Give us the white man you have in your house, for we will kill him." "Nay," said *Cudjoe*, "the white men that carried away your relations are bad men, kill them when you can take them; but this white man is a good man, and you must not kill him."—"But he is a white man," they cried, "and the white men are all bad men, we will kill them all."—"Nay," says he, "you must not kill a man that has done no harm, only for being white. This man is my friend, my house is his post, I am his soldier, and must fight for him; you must kill me before you can kill him. What good man will ever come again under my roof, if I let my floor be stained with a good man's blood?" The negroes, seeing his resolution, and being convinced by his discourse that they were wrong, went away ashamed. In a few days Murray went abroad again with his friend *Cudjoe*, when several of them took him by the hand, and told him, "they were glad they had not killed him; for, as he was a good

man, their god would have been very angry, and would have spoiled their fishing."

As it is our intention to record whatever we meet with, that is curious or wonderful, we hesitate not in inserting the following **SURPRISING EFFECTS OF ANGER**

Physicians and naturalists afford instances of very extraordinary effects of this passion. Borrichius cured a woman of an inveterate tertian ague, which had baffled the art of physic, by putting the patient in a furious fit of anger. Valeriola made use of the same means, with the like success, in a quartan ague. The same passion has been equally salutary to paralytic, gouty, and even dumb persons; to which last it has sometimes given the use of speech. Etmuller gives divers instances of very singular cures wrought by anger; among others, he mentions a person laid up in the gout, who, being provoked by his physician, flew upon him, and was cured. It is true, the remedy is somewhat dangerous in the application, when a patient does not know how to use it with moderation. We meet with several instances of princes, to whom it has proved mortal; *e. g.* Valentinian I. Wenceslaus, Matthias Corvinus, king of Hungary, and others. There are also instances wherein it has produced the epilepsy, jaundice, cholera morbus, diarrhœa, &c. In fact, this passion is of such a nature, that it quickly throws the whole nervous system into preternatural commotions, by a violent stricture of the nervous and muscular parts; and surprisingly augments, not only the systole of the heart, and its contiguous vessels, but also the tone of the fibrous parts in the whole body. It is also certain, that this passion, by the spasmodic stricture it produces in the parts, exerts its power principally on the stomach and intestines, which are highly nervous and membranous parts; whence the symptoms are more dangerous, in proportion to the greater consent of the stomach and intestines with the other nervous parts, and almost with the whole body. The unhappy influence of anger likewise on the biliary and hepatic ducts, is very surprising; since, by an intense constriction of these, the liver is not only rendered scirrhus, but stones also are often generated in the gall-bladder and biliary ducts: these accidents have scarcely any other origin than an obstruction of the free motion and efflux of the bile, by means of this violent stricture. From such a stricture, likewise, proceeds the jaundice, which, in process of time, lays a foundation for calculous concretions in the gall-bladder. By increasing the motion of the fluid, or the spasms of the fibrous parts, by means of anger, a large quantity of blood is forcibly propelled to certain parts; whence it happens, that they are too much distended, and the orifices of the veins distributed there, opened. It is evident, from experience, that anger has a great tendency



F E A R .



DANIEL DANCER.



OLD PARR.

to excite enormous hemorrhages, either from the nose, the aperture of the pulmonary artery, &c. The effects of this passion are well described by Armstrong in the following lines:

“ But there’s a passion, whose tempestuous sway
Tears up each virtue planted in the heart,
And shakes to ruin proud philosophy:
For pale and trembling anger rushes in
With falt’ring speech, and eyes that wildly stare,
Fierce as the tiger, madder than the seas,
Desp’rate, and arm’d with more than human strength;
But he whom anger stings, drops, if he dies,
At once, and rushes apoplectic down;
Or a fierce fever hurries him to hell.”

Now follows an account of some REMARKABLE EFFECTS OF FRIGHT, OR TERROR.

Out of many instances of the fatal effects of fear, the following is selected as one of the most singular:—George Grochantzy, a Polander, who had enlisted as a soldier in the service of the king of Prussia, deserted during the last war. A small party was sent in pursuit of him, and, when he least expected it, surprised him singing and dancing among a company of peasants in an inn. This event, so sudden, and so dreadful in its consequences, struck him in such a manner, that, giving a great cry, he became altogether stupid and insensible, and was seized without the least resistance. They carried him away to Glocau, where he was brought before the council of war, and received sentence as a deserter. He suffered himself to be led and disposed of at the will of those about him, without uttering a word, or giving the least sign that he knew what had happened or would happen to him. He remained immoveable as a statue wherever he was placed, and was wholly regardless of all that was done to him or about him. During all the time that he was in custody, he neither ate, nor drank, nor slept, nor had any evacuation. Some of his comrades were sent to see him; after that, he was visited by some officers of his corps, and by some priests; but he still continued in the same state, without discovering the least signs of sensibility. Promises, entreaties, and threatenings, were equally ineffectual. It was at first suspected that these appearances were feigned; but such suspicions gave way, when it was known that he took no sustenance, and that the involuntary functions of nature were in a great measure suspended. The physicians concluded that he was in a state of hopeless idiocy; and after some time they knocked off his fetters, and left him at liberty to go where he would. He received his liberty with the same insensibility that he had shewn on other occasions; he remained fixed and immoveable, his eyes turned wildly here and there, without

taking cognizance of any object, and the muscles of his face were fallen and fixed, like those of a dead body. He passed twenty days in this condition, without eating, drinking, or any evacuation, and died on the 20th day. He had been sometimes heard to fetch deep sighs; and once he rushed with great violence on a soldier who had a mug of liquor in his hand, forced the mug from him, and having drank the liquor with great eagerness, let the mug drop to the ground.—Among the ludicrous effects of fear, the following instance, quoted from a French author, by Mr. Andrews, in his volume of *Anecdotes*, shews upon what slight occasions this passion may be sometimes excited in a very high degree, and even in persons the most unlikely to entertain fear. “Charles Gustavus (successor to Christina, queen of Sweden,) was besieging Prague, when a boor of a most extraordinary visage desired admittance to his tent; and being allowed entrance, offered, by way of amusing the king, to devour a whole hog of 100 weight in his presence. The old general, Konigsmarc, who stood by the king’s side, and who, soldier as he was, had not got rid of the prejudices of his childhood, hinted to his royal master that the peasant ought to be burnt as a sorcerer. ‘Sir,’ said the fellow, irritated at the remark, ‘if your majesty will but make that old gentleman take off his sword and his spurs, I will eat him, before I begin the hog.’ Konigsmarc (who had, at the head of a body of Swedes, performed wonders against the Austrians, and who was looked upon as one of the bravest men of the age,) could not stand this proposal; especially as it was accompanied by a most hideous and preternatural expansion of the frightful peasant’s jaws. Without uttering a word, the veteran turned round, ran out of the court, nor thought himself safe until he had arrived at his quarters, where he remained above 24 hours locked up securely, before he had got rid of the panic which had so severely affected him.” Such is the influence of fright or terror.

The following is a notable instance of THE POWER OF CONSCIENCE.

It is a saying, that no man ever offended his own conscience, but first or last it was revenged upon him. The power of conscience indeed has been remarked in all ages, and the examples of it upon record are numerous and striking.—The following is related by Mr. Fordyce, in his *Dialogues on Education*, (vol. ii. p. 501.) as a real occurrence, which happened in a neighbouring state not many years ago. A jeweller, a man of good character and considerable wealth, having occasion, in the way of his business, to travel to some distance from the place of his abode, took along with him a servant, in order to take care of his portmanteau. He had with him

some of his best jewels, and a large sum of money, to which his servant was likewise privy. The master having occasion to dismount on the road, the servant watching his opportunity, took a pistol from his master's saddle, and shot him dead on the spot; then rifled him of his jewels and money, and, hanging a large stone to his neck, threw him into the nearest canal. With his booty he made off to a distant part of the country, where he had reason to believe that neither he nor his master were known. There he began to trade in a very low way at first, that his obscurity might screen him from observation, and in the course of a good many years seemed to rise, by the natural progress of business, into wealth and consideration; so that his good fortune appeared at once the effect and reward of industry and virtue. Of these he counterfeited the appearance so well, that he grew into great credit, married into a good family, and by laying out his sudden stores discreetly, as he saw occasion, and joining to all an universal affability, he was admitted to a share of the government of the town, and rose from one post to another, till at length he was chosen chief magistrate. In this office he maintained a fair character, and continued to fill it with no small applause, both as a governor and a judge; till one day, as he sat on the bench, with some of his brethren, a criminal was brought before him, who was accused of murdering his master. The evidence came out full, the jury brought in their verdict that the prisoner was guilty, and the whole assembly waited the sentence of the president of the court (which he happened to be that day) with great suspense. Meanwhile he appeared to be in unusual disorder and agitation of mind, and his colour changed often; at length he rose from his seat, and coming down from the bench, placed himself by the unfortunate man at the bar. "You see before you (said he, addressing himself to those who had sat on the bench with him,) a striking instance of the just awards of heaven, which, this day, after 30 years' concealment, presents to you a greater criminal than the man just now found guilty." Then he made an ample confession of his guilt, and of all the aggravations: "Nor can I feel (continued he) any relief from the agonies of an awakened conscience, but by requiring that justice be forthwith done against me in the most public and solemn manner." We may easily suppose the amazement of all the assembly, and especially of his fellow judges. However, they proceeded, upon this confession, to pass sentence upon him, and he died with all the symptoms of a penitent mind. Let it be our constant aim to keep a conscience void of offence towards God, and towards man; being assured that,

One self-approving hour whole years outweighs
Of stupid starers, and of loud huzzas.

Pope.

CHAP. VI

CURIOSITIES RESPECTING MAN.—(Continued.)

Remarkable Instance of Memory—Surprising Instance of Skill in Numbers—Extraordinary Arithmetical Powers of a Child—Curious Instance of Mathematical Talent—Stone Eater—Poison Eater—Bletonism—Longevity.

REMARKABLE INSTANCE OF MEMORY.

Whence came the active and sagacious mind,
Self-conscious, and with faculties endued
Of understanding, will, and memory,
And reason, to distinguish true from false?
————— Whence, but through an infinite,
Almighty God, supremely wise and just?

Newler.

HORTENSIVS, one of the most celebrated orators of ancient Rome, had so happy a memory, that after studying a discourse, though he had not written down a single word of it, he could repeat it exactly in the same manner in which he had composed it. His powers of mind in this respect were really astonishing; and we are told, that in consequence of a wager with one Sienna, he spent a whole day at an auction, and, when it was ended, recapitulated every article that had been sold, together with the prices, and the names of the purchasers, in their proper order, without erring in one point, as was proved by the clerk, who followed him with his book.

The following is a very SURPRISING INSTANCE OF SKILL IN NUMBERS.

Jedidiah Buxton, was a prodigy, with respect to skill in numbers. His father, William Buxton, was schoolmaster of the parish where he was born, in 1704: yet Jedediah's education was so much neglected, that he was never taught to write; and with respect to any other knowledge but that of numbers, seemed always as ignorant as a boy of ten years of age. How he came first to know the relative proportions of numbers, and their progressive denominations, he did not remember; but to this he applied the whole force of his mind, and upon this his attention was constantly fixed, so that he frequently took no cognizance of external objects, and, when he did it, it was only with respect to their numbers. If any space of time was mentioned, he would soon after say it was so many minutes; and if any distance of way, he would assign

the number of hair-breadths, without any question being asked, or any calculation expected by the company. When he once understood a question, he began to work with amazing facility, after his own method, without the use of a pen, pencil, or chalk, or even understanding the common rules of arithmetic, as taught in the schools. He would stride over a piece of land, or a field, and tell the contents of it almost as exactly as if one had measured it by the chain. In this manner he measured the whole lordship of Elmton, belonging to Sir John Rhodes, and brought him the contents, not only of some thousands in acres, roods, and perches, but even in square inches. After this, for his own amusement, he reduced them into square hair-breadths, computing 48 to each side of the inch. His memory was so great, that while resolving a question, he could leave off, and resume the operation again, where he left off, the next morning, or at a week, a month, or several months, and proceed regularly till it was completed. His memory would doubtless have been equally retentive with respect to other objects, if he had attended to them with equal diligence; but his perpetual application to figures prevented the smallest acquisition of any other knowledge. He was sometimes asked, on his return from church, whether he remembered the text, or any part of the sermon: but it never appeared that he brought away one sentence; his mind, upon a closer examination, being found to have been busied, even during divine service, in his favourite operation, either dividing some time, or some space, into the smallest known parts, or resolving some question that had been given him as a test of his abilities. As this extraordinary person lived in laborious poverty, his life was uniform and obscure. Time, with respect to him, changed nothing but his age; nor did the seasons vary his employment, except that in winter he used a flail, and in summer a ling-hook. In 1754, he came to London, where he was introduced to the Royal Society, who, in order to prove his abilities, asked him several questions in arithmetic; and he gave them such satisfaction, that they dismissed him with a handsome gratuity. In this visit to the metropolis, the only object of his curiosity, except figures, was to see the king and royal family; but they being at Kensington, Jedidiah was disappointed. During his stay in London, he was taken to see King Richard III. performed at Drury-Lane playhouse; and it was expected, either that the novelty and the splendour of the show would have fixed him in astonishment, or kept his imagination in a continual hurry, or that his passions would, in some degree, have been touched by the power of action, though he did not perfectly understand the dialogue. But Jedidiah's mind was employed in the playhouse just as it was employed in every other place. During

the lance, he fixed his attention upon the number of steps; he declared, after a fine piece of music, that the innumerable sounds produced by the instruments had perplexed him beyond measure; and he attended even to Mr. Garrick, only to count the words that he uttered, in which, he said, he perfectly succeeded. Jedidiah returned to the place of his birth, where, if his enjoyments were few, his wishes did not seem to be greater. He applied to his labour with cheerfulness; he regretted nothing that he left behind him in London; and it continued to be his opinion, that a slice of rusty bacon afforded the most delicious repast.

The following account of the Extraordinary Arithmetical Powers of a Child, is extracted from the *Annual Register* of 1812. It is entitled, SOME PARTICULARS RESPECTING THE ARITHMETICAL POWERS OF ZERAH COLBURN, A CHILD UNDER EIGHT YEARS OF AGE.

“The attention of the philosophical world, (says the writer,) has been lately attracted by the most singular phenomenon in the history of the human mind, that perhaps ever existed. It is the case of a child, under eight years of age, who, without any previous knowledge of the common rules of arithmetic, or even of the use and power of the Arabic numerals, and without having given any particular attention to the subject, possesses, as if by intuition, the singular faculty of solving a great variety of arithmetical questions by the mere operation of the mind, and without the usual assistance of any visible symbol or contrivance.

“The name of the child is Zerah Colburn, who was born at Cabut, (a town lying at the head of Onion river, in Vermont, in the United States of America,) on the 1st of September, 1804. About two years ago (August, 1810,) although at that time not six years of age, he first began to shew those wonderful powers of calculation, which have since so much attracted the attention, and excited the astonishment, of every person who has witnessed his extraordinary abilities. The discovery was made by accident. His father, who had not given him any other instruction than such as was to be obtained at a small school established in that unfrequented and remote part of the country, (and which did not include either writing or ciphering,) was much surprised one day to hear him repeating the products of several numbers. Struck with amazement at the circumstance, he proposed a variety of arithmetical questions to him, all of which the child solved with remarkable facility and correctness. The news of this infant prodigy soon circulated through the neighbourhood; and many persons came from distant parts to witness so singular a circumstance. The father, encouraged by the unanimous opinion of all who

came to see him, was induced to undertake, with this child, the tour of the United States. They were every where received with the most flattering expressions; and in the several towns which they visited, various plans were suggested, to educate and bring up the child, free from all expense to his family. Yielding, however, to the pressing solicitations of his friends, and urged by the most respectable, and powerful recommendations, as well as by a view to his son's more complete education, the father has brought the child to this country, where they arrived on the 12th of May last: and the inhabitants of this metropolis have for these last three months had an opportunity of seeing and examining this wonderful phenomenon, and verifying the reports that have been circulated respecting him. Many persons of the first eminence for their knowledge in mathematics, and well known for their philosophical inquiries, have made a point of seeing and conversing with him; and they have all been struck with astonishment at his extraordinary powers. It is correctly true, as stated of him, that—'He will not only determine, with the greatest facility and despatch, the exact number of minutes or seconds in any given period of time; but will also solve any other question of a similar kind. He will tell the exact product arising from the multiplication of any number, consisting of two, three, or four figures, by any other number, consisting of the like number of figures; or any number, consisting of six or seven places of figures, being proposed, he will determine, with equal expedition and ease, all the factors of which it is composed. This singular faculty consequently extends not only to the raising of powers, but also to the extraction of the square and cube roots of the number proposed; and likewise to the means of determining whether it be a prime number (or a number incapable of division by any other number;) for which case there does not exist, at present, any general rule amongst mathematicians.' All these, and a variety of other questions connected therewith, are answered by this child with such promptness and accuracy (and in the midst of his juvenile pursuits) as to astonish every person who has visited him.

"At a meeting of his friends, which was held for the purpose of concerting the best methods of promoting the views of the father, this child undertook, and completely succeeded in raising the number 8 progressively up to the sixteenth power!!! and, in naming the last result, viz. 281,474,976,710,656, he was right in every figure. He was then tried as to other numbers, consisting of one figure; all of which he raised (by actual multiplication, and not by memory) as high as the tenth power, with so much facility and despatch, that the person appointed to take down the results, was obliged to enjoin him

not to be so rapid! With respect to numbers consisting of two figures, he would raise some of them to the sixth, seventh, and eighth power; but not always with equal facility: for the larger the products became, the more difficult he found it to proceed. He was asked the square root of 106929; and before the number could be written down, he immediately answered 327. He was then required to name the cube root of 268,336,125; and with equal facility and promptness he replied, 645. Various other questions of a similar nature, respecting the roots and powers of very high numbers, were proposed by several of the gentlemen present; to all of which he answered in a similar manner. One of the party requested him to name the factors which produced the number 247,483: this he immediately did, by mentioning the two numbers 941 and 263; which indeed are the only two numbers that will produce it, viz. 5×34279 , 7×24485 , 59×2905 , 83×2065 , 35×4897 , 295×581 , and 413×415 . He was then asked to give the factors of 36083: but he immediately replied that it had none; which, in fact, was the case, as 36083 is a prime number. Other numbers were indiscriminately proposed to him, and he always succeeded in giving the correct factors, except in the case of prime numbers, which he discovered almost as soon as proposed. One of the gentlemen asked him how many minutes there were in forty-eight years: and before the question could be written down, he replied, 25,228,800; and instantly added, that the number of seconds in the same period was 1,513,728,000. Various questions of the like kind were put to him; and to all of them he answered with nearly equal facility and promptitude, so as to astonish every one present, and to excite a desire that so extraordinary a faculty should (if possible) be rendered more extensive and useful.

“It was the wish of the gentlemen present, to obtain a knowledge of the method by which the child was enabled to answer, with so much facility and correctness, the questions thus put to him; but to all their inquiries upon this subject (and he was closely examined upon this point) he was unable to give them any information. He positively declared (and every observation that was made seemed to justify the assertion) that he did not know how the answers came into his mind. In the act of multiplying two numbers together, and in the raising of powers, it was evident (not only from the motion of his lips, but also from some singular facts which will be hereafter-mentioned) that some operation was going forward in his mind; yet that operation could not, from the readiness with which the answers were furnished, be at all allied to the usual mode of proceeding with such subjects: and, moreover, he is entirely ignorant of the com-

mon rules of arithmetic, and cannot perform, upon paper, a simple sum in multiplication or division. But in the extraction of roots, and in mentioning the factors of high numbers, it does not appear that any operation can take place, since he will give the answer immediately, or in a very few seconds, where it would require, according to the ordinary method of solution, a very difficult and laborious calculation; and moreover, the knowledge of a prime number cannot be obtained by any known rule.

“It has been already observed, that it was evident, from some singular facts, that the child operated by certain rules known only to himself. This discovery was made in one or two instances, when he had been closely pressed upon that point. In one case he was asked to tell the square of 4395; he at first hesitated, fearful that he should not be able to answer it correctly; but when he applied himself to it, he said, it was 19,316,025. On being questioned as to the cause of his hesitation; he replied, that he did not like to multiply four figures by four figures: but, said he, ‘I found out another way; I multiplied 293 by 293, and then multiplied this product twice by the number 15, which produced the same result.’ On another occasion, his highness the duke of Gloucester asked him the product of 21,734, multiplied by 543: he immediately replied, 11,801,562; but, upon some remark being made on the subject, the child said that he had, in his own mind, multiplied 65202 by 181. Now, although, in the first instance, it must be evident to every mathematician, that 4395 is equal to 293×15 , and consequently that $(4395)^2 = (293)^2 \times (15)^2$; and, further, that in the second case, 543 is equal to 181×3 , and consequently that $21734 \times (181 \times 3) = (21734 \times 3) \times 181$; yet it is not the less remarkable, that this combination should be immediately perceived by the child, and we cannot the less admire his ingenuity in thus seizing instantly the easiest method of solving the question proposed to him.

“It must be evident, from what has here been stated, that the singular faculty which this child possesses is not altogether dependent upon his memory. In the multiplication of numbers, and in the raising of powers, he is doubtless considerably assisted by that remarkable quality of the mind: and in this respect he might be considered as bearing some resemblance (if the difference of age did not prevent the justness of the comparison) to the celebrated Jedidiah Buxton, and other persons of similar note. But, in the extraction of the roots of numbers, and in determining their factors, (if any,) it is clear, to all those who have witnessed the astonishing quickness and accuracy of this child, that the memory has little or nothing to do with the process. And

in this particular point consists the remarkable difference between the present and all former instances of an apparently similar kind.

“It has been recorded as an astonishing effort of memory, that the celebrated Culer (who, in the science of analysis, might vie even with Newton himself,) could remember the first six powers of every number under 100. This, probably, must be taken with some restrictions: but, if true to the fullest extent, it is not more astonishing than the efforts of this child; with this additional circumstance in favour of the latter, that he is capable of verifying, in a very few seconds, every figure which he may have occasion for. It has been further remarked, by the biographer of that eminent mathematician, that ‘he perceived, almost at a single glance, the factors of which his formulæ were composed; the particular system of factors belonging to the question under consideration; the various artifices by which that system may be simplified and reduced; and the relation of the several factors to the conditions of the hypothesis. His expertness in this particular probably resulted, in a great measure, from the ease with which he performed mathematical investigations by head. He had always accustomed himself to that exercise; and, having practised it with assiduity, (even before the loss of sight, which afterwards rendered it a matter of necessity,) he is an instance to what an astonishing degree it may be acquired, and how much it improves the intellectual powers. No other discipline is so effectual in strengthening the faculty of attention: it gives a facility of apprehension, an accuracy and steadiness to the conceptions; and (what is a still more valuable acquisition) it habituates the mind to arrangement in its reasonings and reflections.’

“It is not intended to draw a comparison between the humble, though astonishing, efforts of this infant prodigy, and the gigantic powers of that illustrious character, to whom a reference has just been made: yet we may be permitted to hope and expect that those wonderful talents, which are so conspicuous at this early age, may, by a suitable education, be considerably improved and extended; and that some new light will eventually be thrown upon those subjects, for the elucidation of which his mind appears to be peculiarly formed by nature, since he enters the world with all those powers and faculties which are not even attainable by the most eminent, at a more advanced period of life. Every mathematician must be aware of the important advantages which have sometimes been derived from the most simple and trifling circumstance; the full effect of which has not always been evident at first sight. To mention one singular instance of this kind:—The very simple improvement of expressing

the powers and roots of quantities by means of indices, introduced a new and general arithmetic of exponents: and this algorithm of powers led the way to the invention of logarithms, by means of which all arithmetical computations are so much facilitated and abridged. Perhaps this child possesses a knowledge of some more important properties connected with this subject: although he is incapable at present of giving any satisfactory account of the state of his mind, or of communicating to others the knowledge which it is so evident he does possess; yet there is every reason to believe, that, when his mind is more cultivated, and his ideas more expanded, he will be able not only to divulge the mode by which he at present operates, but also point out some new sources of information on this interesting subject.

“The case is certainly one of great novelty and importance; and every literary character, and every friend to science, must be anxious to see the experiment fairly tried, as to the effect which a suitable education may produce on a mind constituted as his appears to be. With this view, a number of gentlemen have taken the child under their patronage, and have formed themselves into a committee for the purpose of superintending his education. Application has been made to gentleman of science, well known for his mathematical abilities, who has consented to take the child under his immediate tuition: the committee, therefore, propose to withdraw him for the present from public exhibition, in order that he may fully devote himself to his studies. But whether they shall be able to accomplish the object they have in view, will depend upon the assistance which they may receive from the public. What further progress this child made under the patronage and tuition of his kind and benevolent friends, the editor is not, at present, able to ascertain.”

“We proceed to a CURIOUS INSTANCE OF MATHEMATICAL TALENT

A singular instance of early mathematical talent has been made known by Mr. Gough, in the *Philosophical Magazine*.—Thomas Gasking, the son of a journeyman shoemaker of Penrith, was but nine years of age when the account was written: “he was, (says the writer), however, in consequence of the education given him by his father, (an acute and industrious man,) become well acquainted with the leading propositions of Euclid, reads and works algebra with facility, understands and uses logarithms, and has entered on the study of fluxions. On being examined, he demonstrated propositions from the first books of Euclid; discovered the unknown side of a triangle, from the two sides and the angle given; and solved cases in spherical trigonometry. In algebra, he gave the solutions

of a number of quadratic equations; answered questions which contained two unknown quantities; and applied algebra to geometry. He answered problems relating to the maxima of numbers and of geometrical magnitudes, with ease; and, on many other mathematical points, gave very high promises of future excellence."

The following remarkable account of a **STONE EATER**, is given as a fact in several respectable works.

In 1760, was brought to Avignon, a true lithophagus, or stone-eater. He not only swallowed flints of an inch and a half long, a full inch broad, and half an inch thick; but such stones as he could reduce to powder, such as marble, pebbles, &c. he made into paste, which was to him a most agreeable and wholesome food. I examined this man, says the writer, with all the attention I possibly could; I found his gullet very large, his teeth exceedingly strong, his saliva very corrosive, and his stomach lower than ordinary, which I imputed to the vast number of flints he had swallowed, being about five-and-twenty, one day with another. Upon interrogating his keeper, he told me the following particulars: "This stone-eater," says he, "was found three years ago, in a northern uninhabited island, by some of the crew of a Dutch ship. Since I have had him, I make him eat raw flesh with the stones; I could never get him to swallow bread. He will drink water, wine, and brandy, which last liquor gives him infinite pleasure. He sleeps at least twelve hours in a day, sitting on the ground, with one knee over the other, and his chin resting on his right knee. He smokes almost all the time he is not asleep, or is not eating. The flints he has swallowed, he voids somewhat corroded, and diminished in weight; the rest of his excrements resembles mortar."

The following account of a **POISON EATER** is said to be an undoubted fact.

A man, about 106 years of age, formerly living in Constantinople, was known all over that city by the name of Solymán, the eater of corrosive sublimate. In the early part of his life, he accustomed himself, like other Turks, to the use of opium; but not feeling the desired effect, he augmented his dose to a great quantity, without feeling any inconvenience, and at length took a drachm of sixty grains daily. He went into the shop of a Jew apothecary, to whom he was unknown, asked for a drachm of sublimate, which he mixed in a glass of water, and drank directly.

The apothecary was dreadfully alarmed, because he knew the consequence of being accused of poisoning a Turk: but what was his astonishment, when he saw the same man return

the next day for a dose of the same quantity. It is said that Lord Elgin, Mr. Smith, and other Englishmen, knew this man, and have heard him declare, that his enjoyment after having taken this active poison, is the greatest he ever felt from any cause whatever.

We now proceed to give an account of a very extraordinary faculty, entitled BLETONISM.

This is a faculty of perceiving and indicating subterraneous springs and currents by sensation. The term is modern, and derived from a Mr. Bleton, who excited universal attention by possessing this faculty, which seems to depend upon some peculiar organization. Concerning the reality of this extraordinary faculty, there occurred great doubts among the learned. But M. Thouvenel, a French philosopher, seems to have put the matter beyond dispute, in two memoirs which he published upon the subject. He was charged by Louis XVI. with a commission to analyze the mineral and medicinal waters of France; and, by repeated trials, he had been so fully convinced of the capacity of Bleton to assist him with efficacy in this important undertaking, that he solicited the ministry to join him in the commission upon advantageous terms. All this shews that the operations of Bleton have a more solid support than the tricks of imposture or the delusions of fancy. In fact, a great number of his discoveries are ascertained by respectable affidavits. The following is a strong instance in favour of Bletonism.—“For a long time the traces of several springs and their reservoirs in the lands of the Abbey de Verveins had been entirely lost. It appeared, nevertheless, by ancient deeds and titles, that these springs and reservoirs had existed. A neighbouring abbey was supposed to have turned their waters for its benefit into other channels, and a lawsuit was commenced upon this supposition. M. Bleton was applied to: he discovered at once the new course of the waters in question; his discovery was ascertained; and the lawsuit terminated.” M. Thouvenel assigns principles upon which the impressions made by subterraneous waters and mines may be accounted for. Having ascertained a general law, by which subterraneous electricity exerts an influence on the bodies of certain individuals, eminently susceptible of that influence, and shewn that this law is the same whether the electrical action arise from currents of warm or cold water, from currents of humid air, from coal or metallic mines, from sulphur, and so on, he observes, that there is a diversity in the physical and organical impressions which are produced by this electrical action, according as it proceeds from different fossile bodies, which are more or less conductors of electrical emanations. There are also artificial processes, which concur

in leading us to distinguish the different conductors of mineral electricity; and in these processes the use of electrometrical rods deserves the attention of philosophers, who might perhaps, in process of time, substitute in their place a more perfect instrument. Their physical and spontaneous mobility, and its electrical causes, are demonstrated by indisputable experiments. On the other hand, M. Thouvenel proves, by very plausible arguments, the influence of subterraneous electrical currents, compares them with the electrical currents of the atmosphere, points out the different impressions they produce, according to the number and quality of the bodies which act, and the diversity of those which are acted upon. The ordinary sources of cold water make impressions proportional to their volume, the velocity of their currents, and other circumstances. Their stagnation destroys every species of electrical influence; at least, in this state they have none that is perceptible. Their depth is indicated by geometrical processes, founded upon the motion and divergence of the electrical rays.

We shall conclude this chapter with some EXTRAORDINARY INSTANCES OF LONGEVITY.

In October, 1712, a prodigy is said to have appeared in France, in the person of one Nicholas Petours, who one day entered the town of Coutances. His appearance excited curiosity, as it was observed that he had travelled on foot: he therefore gave the following account of himself, viz. That he was one hundred and eighteen years of age, being born at Granville, near the sea, in the year 1594; that he was by trade a shoemaker; and had *walked* from St. Malo's to Coutances, which is twenty-four leagues distant, in two days. He seemed as active as a young man. He said, "He came to attend the event of a lawsuit, and that he had had four wives; with the first of whom he lived fifty years, the second only twenty months, and the third twenty-eight years and two months, and that to the fourth he had been married two years; that he had had children by the three former, and could boast a posterity which consisted of one hundred and nineteen persons, and extended to the *seventh* generation." He further stated, "that his family had been as remarkable for longevity as himself; that his mother lived until 1691; and that his father, in consequence of having been *wounded*, died at the age of one hundred and twenty-three, that his uncle and godfather, Nicholas Petours, curate of the parish of Balcine, and afterward canon and treasurer of the cathedral of Coutances, died there, aged above one hundred and thirty-seven years, having celebrated mass five days before his decease. Jacqueline Fauvel, wife to the park-keeper of the bishop of Coutances, (he said,) died in consequence of a fright, in the village of St.

Nicholas, aged one hundred and twenty-one years, and that she was able to spin eight days before her decease." Among the refugees from this part of France, we have known and heard of many instances of longevity, but certainly none equal to these



CHAP. VII.

CURIOSITIES RESPECTING MAN.—(Continued.)

Combustion of the Human Body, produced by the long immoderate Use of Spirituous Liquors. From the Journal de Physique, Pluviose, Year 8: written by Pierre Aime Lair.

IN natural as well as civil history, there are facts presented to the meditation of the observer, which, though confirmed by the most convincing testimony, seem, on the first view, to be destitute of probability. Of this kind is that of people consumed without coming into contact with common fire, and of bodies being thus reduced to ashes. How can we conceive that fire, in certain circumstances, can exercise so powerful an action on the human body as to produce this effect? One might be induced to give less faith to these instances of combustion, as they seem to be rare. I confess, that at first they appeared to me worthy of very little credit; but they are presented to the public as true, by men whose veracity seems unquestionable. Bianchini, Mossei, Roni, Le Cat, Vicq. d'Azyr, and several men distinguished by their learning, have given certain testimony of the facts. Besides, is it more surprising to experience such incineration than to void saccharine urine, or to see the bones softened, or of the diabetes mellitus. This marbific disposition, therefore, would be one more scourge to afflict humanity; but in physics, facts being always preferable to reasoning, I shall here collect those which appear to me to bear the impression of truth; and, lest I should alter the sense, I shall quote them just as they are given in the works from which I have extracted them.

We read in the transactions of Copenhagen, that in 1692, a woman of the lower class, who for three years had used spirituous liquors to such excess that she would take no other nourishment, having sat down one evening on a straw chair to sleep, was consumed in the night-time, so that next morning no part of her was found, but the skull, and the extreme joints of the fingers; all the rest of her body, says Jacobus, was reduced to ashes.

The following extract of the memoir of Bianchini, is taken from the Annual Register for 1763:—The Countess Cornelia Bandi, of the town of Cesena, aged 62, enjoyed a good state of health. One evening, having experienced a sort of drowsiness, she retired to bed, and her maid remained with her till she fell asleep. Next morning, when the girl entered to awaken her mistress, she found nothing but the remains of her mistress, in a most horrid condition. At the distance of four feet from the bed was a heap of ashes, in which could be distinguished the legs and arms untouched. Between the legs lay the head, the brain of which, together with half the posterior part of the cranium, and the whole chin, had been consumed; three fingers were found in the state of a coal; the rest of the body was reduced to ashes, and contained no oil; the tallow of two candles was melted on a table, but the wicks still remained, and the feet of the candlesticks were covered with a certain moisture. The bed was not damaged; the bed-clothes and coverlid were raised up and thrown on one side, as is the case when a person gets up. The furniture and tapestry were covered with a moist kind of soot, of the colour of ashes, which had penetrated the drawers and dirtied the linen. This soot having been conveyed to a neighbouring kitchen, adhered to the walls and the utensils. A piece of bread in the cupboard was covered with it, and no dog would touch it. The infectious odour had been communicated to other apartments. The Annual Register states, that the Countess Cesena was accustomed to bathe all her body in camphorated spirits of wine. Bianchini caused the detail of this deplorable event to be published at the time when it took place, and no one contradicted it: it was also attested by Sapia Maffei, a learned contemporary of Bianchini, who was far from being credulous; and, in the last place, this surprising fact was confirmed to the Royal Society of London, by Paul Rolli. The Annual Register mentions also two other facts of the same kind, which occurred in England; one at Southampton, and the other at Coventry.

An instance of the like kind is preserved in the same work, in a letter of Mr. Wilmer, surgeon:—"Mary Clues, aged 50, was much addicted to intoxication. Her propensity to this vice had increased after the death of her husband, which happened a year and a half before: for about a year, scarcely a day had passed, in the course of which she did not drink at least half a pint of rum or aniseed-water. Her health gradually declined, and about the beginning of February she was attacked by the jaundice, and confined to her bed. Though she was incapable of much action, and not in a condition to work, she still continued her old habit of drinking

every day, and smoking a pipe of tobacco. The bed in which she lay, stood parallel to the chimney of the apartment, the distance from it about three feet. On Saturday morning, the 1st of March, she fell on the floor; and her extreme weakness having prevented her from getting up, she remained in that state till some one entered and put her to bed. The following night she wished to be left alone: a woman quitted her at half past eleven, and, according to custom, shut the door and locked it. She had put on the fire two large pieces of coal, and placed a light in a candlestick, on a chair, at the head of the bed. At half after five in the morning, a smoke was seen issuing through the window; and the door being speedily broken open, some flames which were in the room were soon extinguished. Between the bed and the chimney were found the remains of the unfortunate Clues; one leg and a thigh were still entire, but there remained nothing of the skin, the muscles, or the viscera. The bones of the cranium, the breast, the spine, and the upper extremities, were entirely calcined, and covered with a whitish efflorescence. The people were much surprised that the furniture had sustained so little injury. The side of the bed which was next to the chimney, had suffered the most; the wood of it was slightly burnt, but the feather-bed, the clothes, and covering, were safe. I entered the apartment about two hours after it had been opened, and observed that the walls and every thing in it were blackened; that it was filled with a very disagreeable vapour; but that nothing except the body exhibited any strong traces of fire."

This instance has great similarity to that related by Vicq. d'Azyr, in the *Cyclopedie Methodique*, under the head of Pathologic Anatomy of Man. A woman, about 50 years of age, who indulged to excess in spirituous liquors, and got drunk every day before she went to bed, was found entirely burnt, and reduced to ashes. Some of the osseous parts only were left, but the furniture of the apartment had suffered very little damage. Vicq. d'Azyr, instead of disbelieving this phenomenon, adds, that there has been many other instances of the like nature.

We find also a circumstance of this kind, in a work entitled, *Acta Medica et Philosophica Hafniensia*; and in the work of Henry Bohanser, entitled, *Le Nouveau Phosphore Enflamme*.—A woman at Paris, who had been accustomed, for three years, to drink spirit of wine to such a degree that she used no other liquor, was one day found entirely reduced to ashes, except the skull and the extremities of the fingers.

The Transactions of the Royal Society of London present also an instance of human combustion, no less extraordinary. It was mentioned at the time it happened, in all the journals.

it was then attested by a great number of eye-witnesses, and became the subject of many learned discussions. Three accounts of this event, by different authors, all nearly coincide. The fact is related as follows:—"Grace Pitt, the wife of a fishmonger, of the parish of St. Clement, Ipswich, aged about 60, had contracted a habit, which she continued for several years, of coming down every night from her bed-room, half-dressed, to smoke a pipe. On the night of the 9th of April, 1744 she got up from her bed as usual. Her daughter, who slept with her, did not perceive she was absent till next morning when she awoke, soon after which she put on her clothes, and, going down into the kitchen, found her mother stretched out on the right side, with her head near the grate, the body extended on the hearth, with the legs on the floor, which was of deal, having the appearance of a log of wood, consumed by a fire without apparent flames. On beholding this spectacle, the girl ran in great haste, and poured over her mother's body some water, contained in two large vessels, in order to extinguish the fire; while the fetid odour and smoke which exhaled from the body, almost suffocated some of the neighbours who had hastened to the girl's assistance. The trunk was in some measure incinerated, and resembled a heap of coals, covered with white ashes. The head, the arms, the legs, and the thighs, had also participated in the burning. This woman, it is said, had drunk a large quantity of spirituous liquor, in consequence of being overjoyed to hear that one of her daughters had returned from Gibraltar. There was no fire in the grate, and the candle had burnt entirely out in the socket of the candlestick, which was close to her. Besides, there were found near the consumed body, the clothes of a child, and a paper screen, which had sustained no injury by the fire. The dress of this woman consisted of a cotton gown."

Le Cat, in a memoir on spontaneous burning, mentions several other instances of combustion of the human body.--- "Having (says he) spent several months at Rheims in the year 1724 and 1725, I lodged with Sieur Millet, whose wife got intoxicated every day. The domestic economy of the family was managed by a pretty young girl; which I must not omit to remark, in order that the circumstances which accompanied the fact I am about to relate, may be better understood.--- This woman was found consumed on the 20th of February, 1725, at the distance of a foot and a half from the hearth in her kitchen. A part of the head only, with a portion of the lower extremities, and a few of the vertebræ, had escaped combustion. A foot and a half of the flooring under the body had been consumed, but a kneading-trough and a powdering-tub, which were near the body, sustained no injury. M. Criteen, a surgeon, examined the remains of the body with every judi-

cial formality. Jean Millet, the husband, being interrogated by the judges who instituted the inquiry into the affair, declared, that about eight in the evening on the 19th February, he had retired to rest with his wife, who not being able to sleep, had gone into the kitchen, where he thought she was warming herself; that, having fallen asleep, he was awakened about two o'clock with a disagreeable odour, and that, having run to the kitchen, he found the remains of his wife in the state described in the report of the physicians and surgeons. The judges having no suspicion of the real cause of this event, prosecuted the affair with the utmost diligence. It was very unfortunate for Millet that he had a handsome servant-maid, for neither his probity nor innocence was able to save him from the suspicion of having got rid of his wife by a concerted plot, and of having arranged the rest of the circumstances in such a manner as to give it the appearance of an accident. He experienced, therefore, the whole severity of the law; and though, by an appeal to a superior and very enlightened court, which discovered the cause of the combustion, he came off victorious, he suffered so much from uneasiness of mind, that he was obliged to pass the remainder of his melancholy days in a hospital."

Le Cat relates another instance, which has a most perfect resemblance to the preceding: "M. Boinnean, curé of Plerquer, near Dol, (says he,) wrote to me the following letter dated February 22, 1749:—'Allow me to communicate to you a fact which took place here about a fortnight ago. Madame de Boiseon, 80 years of age, exceedingly meagre, who had drunk nothing but spirits for several years, was sitting in her elbow chair before the fire, while her waiting-maid went out of the room for a few moments. On her return, seeing her mistress on fire, she immediately gave an alarm; and some people having come to her assistance, one of them endeavoured to extinguish the flames with his hand, but they adhered to it as if it had been dipped in brandy or oil on fire. Water was brought, and thrown on the lady in abundance, yet the fire appeared more violent, and was not extinguished until the whole flesh had been consumed. Her skeleton, exceedingly black, remained entire in the chair, which was only a little scorched; one leg only, and the two hands, detached themselves from the rest of the bones. It is not known whether her clothes had caught fire by approaching the grate. The lady was in the same place in which she sat every day; there was no extraordinary fire, and she had not fallen. What makes me suppose that the use of spirits might have produced this effect is, my having been assured, that at the gate of Dinan an accident of the like kind happened to another woman, under similar circumstances.'"

To these instances, which I have multiplied to strengthen the evidence, I shall add two other facts of the same kind, published in the *Journal de Medicine*. The first took place at Aix, in Provence, and is thus related by Muraire, a surgeon:—"In the month of February, 1779, Mary Jauffret widow of Nicholas Gravier, shoemaker, of a small size, exceedingly corpulent, and addicted to drinking, having been burnt in her apartment, M. Rocas, my colleague, who was commissioned to make a report respecting her body, found only a mass of ashes, and a few bones, calcined in such a manner, that on the least pressure they were reduced to dust. The bones of the cranium, one hand, and a foot, had in part escaped the action of the fire. Near these remains stood a table untouched, and under the table a small wooden stove, the grating of which, having been long burnt, afforded an aperture, through which, it is probable, the fire that occasioned the melancholy accident had been communicated: one chair, which stood too near the flames, had the seat and fore feet burnt. In other respects, there was no appearance of fire, either in the chimney or in the apartments; so that, except the fore part of the chair, it appears to me, that no other combustible matter contributed to this speedy incineration, which was effected in the space of seven or eight hours."

The other instance mentioned in the *Journal de Medicine*, took place at Caen, and is thus related by Merille, a surgeon of that city, still alive: "Being requested, on the 3d of June, 1782, by the king's officers, to draw up a report of the state in which I found Mademoiselle Thuars, who was said to have been burnt, I made the following observations:—The body lay with the crown of the head resting against one of the hand-irons, at the distance of eighteen inches from the fire, the remainder of the body was placed obliquely before the chimney, the whole being nothing but a mass of ashes. Even the most solid bones had lost their form and consistence; none of them could be distinguished except the coronal, the two parietal bones, the two lumbar vertebræ, a portion of the tibia, and a part of the omoplate; and even these were so calcined, that they became dust by the least pressure. The right foot was found entire, and scorched at its upper junction, the left was more burnt. The day was cold, but there was nothing in the grate, except two or three bits about an inch diameter, burnt in the middle. None of the furniture in the apartment was damaged. The chair on which Mademoiselle Thuars had been sitting, was found at the distance of a foot from her, and absolutely untouched. I must here observe, that this lady was exceedingly corpulent, that she was about sixty years of age, and much addicted

to spirituous liquors; that the day of her death she had drunk three bottles of wine, and about a bottle of brandy; and that the consumption of the body had taken place in less than seven hours, though, according to appearance, nothing around the body was burnt but the clothes."

The town of Caen affords several other instances of the same kind. I have been told by many people, and particularly a physician of Argentan, named Bouffet, author of an Essay on Intermittent Fevers, that a woman of the lower class, who lived at Place Villars, and who was known to be much addicted to strong liquors, had been found in her house burnt. The extremities of her body only were spared, but the furniture was very little damaged.

The town of Caen records the history of another old woman, addicted to drinking. I was assured, by those who told me the fact, that the flames which proceeded from the body, could not be extinguished by water: but I think it needless to relate this, and the particulars of another event which took place in the same town, because they were not attested by a *procès verbal*, and not having been communicated by professional men, they do not inspire the same degree of confidence.

This collection of instances is supported, therefore, by all those authentic proofs, which can be required to form human testimony; for while we admit the prudent doubt of Descartes, we ought to reject the universal doubt of the Pyrrhonists. The multiplicity and uniformity even of these facts, which occurred in different places, and were attested by so many enlightened men, carry with them conviction; they have such a relation to each other, that we are inclined to ascribe them to the same cause.

Difficulties would, no doubt, be offered from reasoning against these facts; but the writer remarks, that human testimony is not to be rejected, unless the probability that the facts must be impossible, shall be greater than that arising from the concurrence of evidence: and he adds, that the narratives, though varying so widely as to time and place, do very remarkably agree in their tenor. The circumstances are, that, (1) The combustion has usually destroyed the person by reducing the body to a mass of pulverulent fatty matter, resembling ashes. (2) There were no signs of combustion in surrounding bodies, by which it could be occasioned, as these were little, if at all, injured; though, (3) The combustion did not seem to be so perfectly spontaneous, but that some slight cause, such as the fire of a pipe, or a taper, or a candle, seems to have begun it. (4) The persons were generally much addicted to the use of spirituous liquors; were very fat; in most instances, women, and old. (5) The extremities, such

as the legs, hands, or cranium, escaped the fire. (6) Water, instead of extinguishing the fire, gave it more activity, as happens when fat is burned. (7) The residue was oily and fetid ashes, with a greasy soot, of a very penetrating and disagreeable smell.

The theory of the author may be considered as hypothetical, until maturer observations shall throw more light on the subject. The principal fact is, that charcoal and oil, or fat, are known in some instances to take fire spontaneously, and he supposes the carbon of the alcohol to be deposited in the fat parts of the human system, and to produce this effect.

CHAP. VIII.

CURIOSITIES RESPECTING MAN.—(Continued.)

BIOGRAPHICAL.

John Elwes—Daniel Dancer—Henry Wolby—John Henley—Simon Brown, and his Curious Dedication to Queen Caroline—Edward Wortley Montague—Blaise Pascal—Old Parr—George Psalmanazar—John Case—John Lewis Cardiac—John Smeaton—George Morland—Henry Christian Heinecken—Thomas Topham—Zeuxis.

JOHN ELWES.—The family name of this extraordinary miser was Meggot, which he altered in pursuance of the will of Sir Harvey Elwes, his uncle, who left him at least £250,000, and he was possessed of nearly as much of his own. At this time he attended the most noted gaming houses, and after sitting up a whole night at play for thousands, he would proceed to Smithfield to meet his cattle, which were coming to market from his seat in Essex, and there would he stand disputing with a cattle-butcher for a shilling. If the cattle did not arrive, he would walk on to meet them; and more than once he has gone the whole way to his farm without stopping, which was seventeen miles from London. He would walk in the rain in London sooner than pay a shilling for a coach; sit in wet clothes, to save the expense of a fire; eat his provisions in the last stage of putrefaction; and he wore a wig for a fortnight, which he picked up in a lane. In 1774 he was chosen knight of the shire for Berkshire, and his conduct in parliament was perfectly independent. He died in 1789, aged about 77, leaving a fortune of £500,000, besides entailed estates.

Another extraordinary miser was **DANIEL DANCER**. He was born in 1716, near Harrow, in Middlesex. In 1736 he

succeeded to his family estate, which was considerable; but his fathers before him were too great lovers of money to lay out any in improvements: Daniel followed their example, and the farm went worse and worse. He led the life of a hermit for above half a century; his only dealing with mankind arose from the sale of his hay; and he was seldom seen, except when he was out gathering logs of wood from the common, or old iron, or sheep's dung under the hedges. He was frequently robbed; to prevent which, he fastened his door up, and got into his house through the upper window, to ascend which he made use of a ladder, which he drew up after him. His sister, who lived with him many years, left him at her death a considerable increase to his wealth; on which he bought a second-hand pair of black stockings, to put himself in decent mourning. This was an article of luxury, for at other times Daniel wore hay-bands on his legs. He died in 1794, and left his estates to Lady Tempest, who had been very charitable to the poor man and his sister.

Another extraordinary character was HENRY WOLBY, Esq.—He was a native of Lincolnshire, and inherited a clear estate of more than 1000*l.* a year. He was regularly bred at the university, studied for some time in one of the inns of court, and in the course of his travels had spent several years abroad. On his return, this very accomplished gentleman settled on his paternal estate, lived with great hospitality, matched to his liking, and had a beautiful and virtuous daughter, who was married, with his entire approbation, to a Sir Christopher Hilliard, in Yorkshire.

He had now lived to the age of forty, respected by the rich, prayed for by the poor, honoured and beloved by all; when, one day, a youngster, with whom he had some difference in opinion, meeting him in the field, snapped a pistol at him, which happily flashed in the pan. Thinking that this was done only to frighten him, he coolly disarmed the ruffian, and, putting the weapon carelessly in his pocket, thoughtfully returned home; but, after examination, the discovery of bullets in the pistol had such an effect on his mind, that he instantly conceived an extraordinary resolution of retiring entirely from the world, in which he persisted to the end of his life. He took a very fair house in the lower end of Grub-street, near Cripplegate, London, and contracting a numerous retinue into a small family, having the house prepared for his purpose, he selected three chambers for himself; the one for his diet, the other for his lodging, the other for his study. As they were one within another,—while his diet was set on the table by an old maid, he retired into his lodging room; and when his bed was making, into his study; still doing so till all was clear. Out of these chambers, from the time of his entry into them,

he never issued, till he was carried thence, 44 years after, on men's shoulders; neither, in all that time, did his son-in-law, daughter, or grand-child, brother, sister, or kinsman, young or old, rich or poor, of what degree or condition soever, look upon his face, save the ancient maid, whose name was Elizabeth. She only made his fire, prepared his bed, provided his diet, and dressed his chambers. She saw him but seldom, never but in cases of extraordinary necessity, and died not six days before him.

In all the time of his retirement, he never tasted fish or flesh; his chief food was oatmeal gruel; now and then, in summer, he had a salad of some choice cool herbs; and for dainties, when he would feast himself upon a high day, he would eat the yoke of a hen's egg, but no part of the white; what bread he did eat, he cut out of the middle of the loaf, but the crust he never tasted; his constant drink was four-shilling beer, and no other, for he never tasted wine or strong drink. Now and then, when his stomach served, he would eat some kind of sack, and he sometimes drank red cow's milk, which was fetched hot from the cow. Nevertheless, he kept a bountiful table for his servant, and sufficient entertainment for any stranger or tenant, who had occasion or business at his house. Every book that was printed was bought for him, and conveyed to him; but such as related to controversy he always laid aside, and never read.

In Christmas holidays, at Easter, and other festivals, he was provided with all dishes in season, served into his own chamber, with stores of wine, which his maid brought in. Then, after thanks to God for his good benefits, he would put a clean napkin before him, and putting on a pair of clean holland sleeves, which reached to his elbows, cutting up dish after dish in order, he would send one to a poor neighbour, the next to another, whether it were brawn, beef, capon, goose, &c. till he had left the whole table empty; when, giving thanks again, he laid by his linen, and caused the dishes to be taken away: and this he would do, at dinner and supper, upon these days, without tasting of any thing whatsoever. When any clamoured impudently at his gate, they were not, therefore, immediately relieved; but when, from his private chamber, he espied any sick, weak, or lame, he would presently send after them, to comfort, cherish, and strengthen them, and not a trifle to serve them for the present, but so much as would relieve them many days after. He would moreover inquire which of his neighbours were industrious in their callings, and who had great charge of children; and withal, if their labour and industry could not sufficiently supply their families: to such he would liberally send, and relieve them according to their necessities.



ORATOR HENLEY.



JOHN ELWES.



SIMON BROWN.



BLAISE PASCAL.

He died at his house in Grub-street, after an anchoretical confinement of forty-four years, October 29, 1636, aged 84. At his death, his hair and beard was so overgrown, that he appeared rather like a hermit of the wilderness, than the inhabitant of one of the first cities in the world.

A very singular character was JOHN HENLEY, M. A. commonly called Orator Henley. He was born at Melton-Mowbray, Leicestershire, in 1691. His father, the Rev. Simon Henley, and his maternal grandfather, John Dowel, M. A. were both vicars of that parish. Having passed his exercises at Cambridge, and obtained the degree of B. A. he returned to his native place, where he was desired by the trustees to take the direction of the school, which he soon raised to a flourishing condition. Here he began his *Universal Grammar*; finished ten languages, with dissertations prefixed; and wrote his poem on *Esther*, which was well received. He was ordained a deacon by Dr. Wake, then Bishop of Lincoln; and having taken his degree of M. A. was admitted to priest's orders by Dr. Gibson. After preaching many occasional sermons, he went to London, recommended by above thirty letters from the most considerable men in the country, both of the clergy and laity. He there published *Translations of Pliny's Epistles*, of several works of Abbé Vertot, of Montfaucon's *Italian Travels*, in folio, and many original lucubrations. His most generous patron was the Earl of Macclesfield, who gave him a benefice in the country, the value of which, to a resident, would have been above £80 a year; he had likewise a lecture in the city; sermons about town; was more numerously followed, and raised more for the poor children, than any other preacher, except the celebrated George Whitfield. But when he pressed his promise from a great man, of being fixed in town, it was negatived. He then gave up his benefice and lecture, believing the public would be a more hospitable protector of learning and science, than some of the higher ranks in his own order. He preached on Sundays on theological matters, and on Wednesdays upon all other sciences. He declaimed several years against the greatest persons, and occasionally, says Warburton, did Pope that honour. That great poet, however, retaliated in the following satirical lines:

" Imbrown'd with native bronze, lo, Henley stands,
Tuning his voice, and balancing his hands.
How fluent nonsense trickles from his tongue!
How sweet the periods, neither said nor sung!
Still break the benches, Henley, with thy strain,
While Kennet, Hare, and Gibson, preach in vain,
O great restorer of the good old age,
Preacher at once, and zany of thy age!"

Instead of tickets, this extraordinary person struck medals, which he dispersed among his subscribers: A star rising to the meridian, with this motto, "*Ad Summa;*" and below, "*Inveniam viam, aut faciam.*" "*Each auditor paid us.*" He was author of a weekly paper, called "The Hyp Doctor," for which he had £100 a year. In his advertisements and lectures, he often introduced satirical and humorous remarks on the public transactions of the times. He once collected an audience of a great number of shoemakers, by announcing that he could teach them a speedy mode of operation in their business; which proved only to be, the making of shoes from ready-made boots. He died on the 14th of October, 1756, in his 65th year.

The next character we introduce is SIMON BROWNE, with his *Curious Dedication to Queen Caroline*.

Simon Browne was a most extraordinary dissenting minister, and began to preach before he was twenty, at Portsmouth, but afterwards became the pastor at Old Jewry. In 1723, he lost his wife and son, which so affected him, that he quitted his office, and would not even attend public worship, alleging, "that he had fallen under the displeasure of God, who had caused his rational soul to perish, and left him only an animal life, common with brutes; that though he might appear rational to others, he knew no more what he said than a parrot; that it was in vain for him to pray;" and as such, he no longer accounted himself a moral agent. Yet he frequently amused himself with translating the ancient Latin and Greek poets. At the same time, he wrote two very able works in defence of Christianity against Woolston and Tindal. He dedicated one of these works to the Queen, but the Dedication was suppressed by his friends. Being a curiosity of its kind, we shall annex it.

"To the Queen.—Madam: Of all the extraordinary things that have been tendered to your royal hands, since your first happy arrival in Britain, it may be boldly said, what now bespeaks your majesty's acceptance is the chief. Not in itself indeed; it is a trifle unworthy your exalted rank, and what will hardly prove an entertaining amusement to one of your majesty's deep penetration, exact judgment, and fine taste; but on account of the author, who is the first being of the kind, and yet without a name.

"He was once a man, and of some little name; but of no worth, as his present unparalleled case makes but too manifest: for, by the immediate hand of an avenging God, his very thinking substance has for more than seven years been continually wasting away, till it is wholly perished out of him, if it be not utterly come to nothing. None, no, not the least remembrance of its very ruins, remain; not the shadow

of an idea is left, nor any sense, so much as one single one, perfect or imperfect, whole or diminished, ever did appear to a mind within him, or was perceived by it.

“Such a present, from such a thing, however worthless in itself, may not be wholly unacceptable to your majesty, the author being such as history cannot parallel; and if the fact, which is real, and no fiction, or wrong conceit, obtains credit, it must be recorded as the most memorable, and indeed, astonishing event, in the reign of George II. that a tract composed by such a thing, was presented to the illustrious Caroline;—his royal consort need not be added; fame, if I am not misinformed, will tell that with pleasure to all succeeding times. He has been informed, that your majesty’s piety is genuine and eminent, as your excellent qualities are great and conspicuous. This can, indeed, be truly known to the great searcher of hearts only. He alone, who can look into them, can discern if they are sincere, and the main intention corresponds with the appearance; and your majesty cannot take it amiss, if such an author hints, that his secret approbation is of infinitely greater value than the commendation of men, who may be easily mistaken, and are too apt to flatter their superiors. But, if he has been told the truth, such a case as his will certainly strike your majesty with astonishment; and may raise that commiseration in your royal breast, which he has in vain endeavoured to excite in those of his friends; who, by the most unreasonable and ill-founded conceit in the world, have imagined that a thinking being could not, for seven years together, live a stranger to its own powers, exercises, operations, and state; and to what the great God has been doing in it, and to it. If your majesty, in your most retired address to the King of kings, should think of so singular a case, you may perhaps make it your devout request, that the reign of your beloved sovereign and consort may be renowned to all posterity, by the recovery of a soul now in the utmost ruin, the restoration of one utterly lost at present amongst men; and should this case affect your royal breast, you will commend it to the piety and prayers of all the truly devout, who have the honour to be known to your majesty: many such doubtless there are; though courts are not usually the places where the devout resort, or where devotion reigns. And it is not improbable, that multitudes of the pious throughout the land may take a case to heart, that, under your majesty’s patronage comes thus recommended:

“Could such a favour as this restoration be obtained from heaven by the prayers of your majesty, with what transport of gratitude would the recovered being throw himself at your majesty’s feet, and, adoring the divine power and grace, confess himself. I am, &c. SIMON BROWNE.”

The next curious character we shall exhibit is EDWARD WORTLEY MONTAGUE.

He was son of the celebrated Lady Mary Wortley Montague. He passed through such various scenes, that he is well entitled to a place in this collection of curiosities. From Westminster school, where he was placed for education, he ran away thrice. He exchanged clothes with a chimney-sweeper, and followed for some time that sooty occupation. He next joined a fisherman, and cried flounders in Rotherhithe. He then sailed as a cabin-boy for Spain; where he had no sooner arrived, than he ran away from the vessel, and hired himself to a driver of mules. After thus vagabondizing it for some time, he was discovered by the consul, who returned him to his friends in England. They received him with joy, and a private tutor was employed to recover those rudiments of learning which a life of dissipation, blackguardism, and vulgarity, might have obliterated. Wortley was sent to the West Indies, where he remained some time; then returned to England, acted according to the dignity of his birth, was chosen a member, and served in two successive parliaments. His expenses exceeding his income, he became involved in debt, quitted his native country, and commenced that wandering traveller he continued to the time of his death. Having visited most of the eastern countries, he contracted a partiality for their manners. He drank little wine, but a great deal of coffee; wore a long beard; smoked much; and even whilst at Venice, was habited in the eastern style. He sat cross-legged in the Turkish fashion, from choice. With the Hebrew, the Arabic, the Chaldaic, and the Persian languages, he was as well acquainted as with his native tongue. He published several pieces: one on the Rise and Fall of the Roman Empire; another on the Causes of Earthquakes. He had seraglios of wives; but the lady whom he married in England was a washerwoman, with whom he did not cohabit. When she died without leaving issue to him, being unwilling that his estate should go to the Bute family, he set out for England, to marry a young woman already pregnant, whom a friend had provided for him; but he died on his journey.

The next character that comes before us is BLAISE PASCAL. He was one of the sublimest geniuses the world ever produced; was born at Clermont, in Auvergne, in 1623. He never had any preceptor but his father. So great a turn had he for the mathematics, that he learned, or rather invented, geometry, when but twelve years old; for his father was unwilling to initiate him in that science early, for fear of its diverting him from the study of the languages. At sixteen, he composed a curious mathematical piece. About nineteen, he invented his machine of arithmetic. which has been much admired by the

learned. He afterwards employed himself assiduously in making experiments according to the new philosophy, and particularly improved upon those of Toricellius. At the age of twenty-four his mind took a different turn; for, all at once, he became as great a devotee as any age has ever produced, and gave himself up entirely to prayer and mortification.

The next is a character famous for longevity.—THOMAS, or OLD PARR, a remarkable Englishman, who lived in the reign of ten kings and queens. He was the son of John Parr, a husbandman, of Winnington, in the parish of Alderbury, Salop. Following the profession of his father, he laboured hard, and lived on coarse fare. Being taken up to London by the Earl of Arundel, the journey proved fatal to him. Owing to the alteration of his diet, to the change of the air and his general mode of life, he lived but a very short time; though one Robert Samber says, in his work entitled *Long Livers*, that Parr lived 16 years after his presentation to Charles II. He was buried in Westminster Abbey. After his death his body was opened, and an account was drawn up by the celebrated Dr. Harvey, of which the following is an extract: "He had a large breast, not fungous, but sticking to his ribs, and distended with blood; a lividness in his face, as he had a difficulty of breathing a little before his death; and a long lasting warmth in his arm-pits and breast after it; which sign, together with others, were so evident in his body as they use to be on those who die by suffocation. His heart was great, thick, fibrous, and fat; the blood in the heart, blackish and diluted; the cartilages of the sternum not more bony than in others, but flexile and soft. His viscera were sound and strong, especially the stomach; and he used to eat often, by night and day, though contented with old cheese, milk, coarse bread, small beer, and whey; and, which is more remarkable, he ate at midnight a little before he died. His kidneys were covered with fat, and pretty sound; only on the interior surface were found some aqueous or serous abscesses, whereof one was near the bigness of a hen's egg, with a yellowish water in it, having made a roundish cavity, impressed on that kidney; whence some thought it came, that, a little before his death, a suppression of urine had befallen him; though others were of opinion, that his urine was suppressed upon the regurgitation of all the serosity into his lungs. There was not the least appearance of any stony matter, either in the kidneys or bladder. His bowels were also sound, a little whitish without. His spleen very little, hardly equal to the bigness of one kidney. In short, all his inward parts appeared so healthy, that if he had not changed his diet and air, he might, perhaps, have lived a good while longer. The cause of his death was imputed chiefly to the change of food and air; forasmuch

as coming out of a clear, thin, and free air, he came into the thick air of London; and, after a constant, plain, and homely country diet, he was taken into a splendid family, where he fed high, and drank plentifully of the best wines, whereupon the natural functions of the parts of his body were overcharged, his lungs obstructed, and the habit of the whole body quite disordered; upon which there could not but ensue a dissolution. His brain was sound, entire, and firm; and though he had not the use of his eyes, nor much of his memory, several years before he died, yet he had his hearing and apprehension very well; and was able, even to the 130th year of his age, to do any husbandman's work, even threshing of corn."—The following summary of his life is from Oldy's MS. Notes on Fuller's Worthies:

"Old Parr was born 1483; lived at home until 1500, aged 17, when he went out to service. 1518, aged 35, returned home from his master. 1522, aged 39, spent four years on the remainder of his father's lease. 1543, aged 60, ended the first lease he renewed of Mr. Lewis Porter. 1563, aged 80, married Jane, daughter of John Taylor, a maiden; by whom he had a son and a daughter, who both died very young. 1564, aged 81, ended the second lease which he renewed of Mr. John Porter. 1585, aged 102, ended the third lease he had renewed of Mr. Hugh Porter. 1588, aged 105, did penance in Alderbury church, for having a criminal connection with Katherine Milton, by which she proved with child. 1595, aged 112, he buried his wife Jane, after they had lived 32 years together. 1605, aged 122, having lived ten years a widower, he married Jane, widow of Anthony Adda, daughter of John Lloyd, of Gilsells, in Montgomeryshire, who survived him. 1635, aged 152 and 9 months, he died, after they had lived together 30 years, and after 50 years' possession of his last lease."—Length of years are of no use, unless they be spent in the practice of virtue.

The next character is a noted impostor, under the assumed name of GEORGE PSALMANAZAR. He was a very extraordinary genius, born in France, and educated in a Jesuit's college; upon leaving which, he fell into a mean, rambling way of life. At Liege, he entered into the Dutch service, and afterwards into that of Cologne. Having stolen the habit and staff of a pilgrim out of a church, he begged through several countries, in elegant Latin, and, accosting only gentlemen and clergymen, received liberal supplies, which he spent as freely. In Germany, he passed for a native of Formosa, a convert to Christianity, and a sufferer for it. At Rotterdam he lived upon raw flesh, roots, and vegetables. At Sluys he fell in with Brigadier Lauder, a Scots colonel, who introduced him to the chaplain; who, to recommend himself to the bishop of Lon-

don, took him over to that city. The bishop patronised him with credulous humanity, and a large circle of his great friends considered him as a prodigy. He published a History of Formosa, and, what was most extraordinary, invented a character and language for that island, and translated the Church Catechism in to it, which was examined by learned critics, and approved. Some of the learned, however, doubted him, particularly Drs. Halley, Mead, and Woodward. He was allowed the use of the Oxford Library, and employed in compiling The Universal History. Some errors in his history first led him to be suspected as an impostor. He died in 1753; and in his last will confessed the imposture.

The next subject is a celebrated Quack Doctor, named JOHN CASE. He was a native of Lyme Regis, in Dorsetshire, was a noted empyric and astrologer, and looked upon as the successor of the famous Lilly, whose magical utensils he possessed. He is said to have got more by this distich over his door, than Dryden, by all his poetry :

“ Within this place
Lives Doctor Case.”

And he was, doubtless, well paid for composing that which he affixed to his pill boxes :

“ Here’s fourteen pills for thirteen pence,
Enough in any man’s own conscience.”

There is a story told of him and Dr. Radcliff: being together at a tavern, Radcliff said, “ Here, brother Case; I drink to all the fools your patients.”—“ Thank ye,” quoth Case; “ let me have all the fools, and you are welcome to the rest.” He wrote a nonsensical rhapsody, called the Angelical Guide, shewing men and women their lot and chance in this elementary life.

Our next character is famous for prematurity of genius, and named JOHN LEWIS CANDIAC. He was born at Candiac, in the diocese of Nismes, in France, in 1719. In the cradle he distinguished his letters; at thirteen months he knew them perfectly; at three years of age he read Latin, either printed or in manuscript; at four, he translated from that tongue; at six, he read Greek and Hebrew, was master of the principles of arithmetic, history, geography, heraldry, and the science of medals; and had read the best authors on almost every branch of literature. He died of a complication of disorders, at Paris, in 1726.

The next character deserves to be recorded as one that was eminently useful in his day and generation. JOHN SMEATON, born near Leeds, in 1724, was an eminent civil engineer. The strength of his understanding, and the originality of his genius, appeared at an early age: his playthings were not the

playthings of children, but the tools which men employ : and he appeared to have greater entertainment in seeing the men in the neighbourhood work, and in asking them questions, than in any thing else. One day he was seen (to the distress of his friends) on the top of his father's barn, fixing up something like a windmill : another time he attended some men fixing a pump, at a neighbouring village, and observing them cut off a piece of bored pipe, he was so lucky as to procure it, and he actually made with it a working pump that raised water. This happened while he was in petticoats, and most likely before he had attained his sixth year.

While we admire the ingenuity of the next character, we must lament that his conduct was licentious. It is the well-known GEORGE MORLAND, an ingenious, dissipated, and unfortunate painter. As he had no other education than what was connected with the pencil and pallet, he shunned the society of the well-informed and well-bred ; and his pictures accordingly are taken, for the most part, from low life, and from the most humble, if not the most shocking, situations in which mankind consort. The following anecdote will give a sufficient view of Morland's character, upon which it would give us pain to dwell at greater length. " He was found (says his biographer) at one time in a lodging in Somer's-Town, in the following extraordinary circumstances : his infant child, that had been dead nearly three weeks, lay in its coffin in one corner of the room ; an ass and foal stood munching barley straw out of the cradle ; a sow and pigs were solacing themselves in the recess of an old cupboard ; and himself whistling over a beautiful picture that he was finishing at his easel, with a bottle of gin hung upon the side, and a live mouse sitting (or if you please, kicking) for its portrait." His constitution, exhausted by dissipation, rapidly gave way, and he died before he had reached his fortieth year.

The next character was indeed a prodigy, that shone like a meteor, and soon vanished away. We shall introduce him under the name of CHRISTIAN HENRY HEINECKEN.

He was born at Lubeck, February 6, 1721, and died there, June 27, 1725, after having displayed the most amazing proofs of intellectual powers. He could talk at ten months old, and had scarcely completed his first year, when he already knew and recited the principal facts contained in the five books of Moses, with a number of verses on the creation : at thirteen months, he knew the history of the Old Testament ; and the New, at fourteen ; in his thirtieth month, the history of the nations of antiquity, geography, anatomy, the use of maps, and nearly 5000 Latin words. Before the end of his third year, he was well acquainted with the history of Denmark, and the genealogy of the crowned heads of



EDWARD WORTLEY MONTAGUE.



GEORGE PSALMANAZAR.



JOHN LEWIS CARDIAC.



JOHN SMEATON.



JOHN CASE.



THOMAS TOPHAM



ZENXIS.



NICHOLAS PESCE.

Europe; in his fourth year he had learned the doctrines of divinity, with their proofs from the Bible; ecclesiastical history; the institutes; 200 hymns, with their tunes; 80 psalms; entire chapters of the Old and New Testaments; 1500 verses and sentences from ancient Latin classics; almost the whole *Orbis Pictus* of Comenius, whence he had derived all his knowledge of the Latin language; arithmetic; the history of the European empires and kingdoms; could point out, in the maps, whatever place he was asked for, or passed by in his journeys; and recited all the ancient and modern historical anecdotes relating to it. His stupendous memory caught and retained every word he was told: his ever active imagination used, whatever he saw or heard, instantly to apply some example or sentence from the Bible, geography, profane or ecclesiastical history, the *Orbis Pictus*, or from ancient classics. At the court of Denmark, he delivered twelve speeches without once faltering; and underwent public examination on a variety of subjects, especially the history of Denmark. He spoke German, Latin, French, and low Dutch, and was exceedingly good-natured, and well-behaved, but of a most tender and delicate bodily constitution; never ate any solid food, but chiefly subsisted on nurse's milk, not being weaned till within a very few months of his death, at which time he was not quite four years old. There is a dissertation on this, published by M. Martini, at Lubeck, 1730, where the author attempts to assign the natural causes for the astonishing capacity of this great man in embryo, who was just shewn to the world, and snatched away.

The next character is of a different description, being famous for strength of body; he is named THOMAS TOPHAM.

This person was remarkable for muscular strength. He kept a public-house at Islington, and used to perform surprising feats, such as breaking a broomstick of the first magnitude, by striking it against his bare arm; lifting two hogsheads of water; heaving his horse over the turnpike-gate; carrying the beam of a house as a soldier would his firelock, &c. He also could roll up a pewter dish of seven pounds, as a man rolls up a sheet of paper; squeeze a pewter quart together at arms' length; and lift two hundred weight with his little finger, over his head. At Derby, he broke a rope fastened to the floor, that would sustain twenty hundred weight; and lifted an oak table, six feet long, with his teeth, though half a hundred weight was hung at the extremity. He took Mr. Chambers, vicar of All Saints, who weighed twenty-seven stone, and raised him with one hand. He stabbed himself, after quarrelling with, and wounding his wife, 1749.—Extraordinary strength of body is of little value, if strength of virtue be wanting

We shall conclude this chapter with a celebrated Painter of Antiquity, named ZEUXIS.

This celebrated painter flourished about 400 years B. C. He was born at Heraclea; but as there have been many cities of that name, it cannot be certainly determined which of them had the honour of his birth. Some conjecture, that it was Heraclea, near Crotona, in Italy. He carried painting to a much higher degree of perfection than Apollodorus had left it; discovered the art of properly disposing of lights and shades, and particularly excelled in colouring. He amassed immense riches; and then resolved to sell no more of his pictures, but gave them away; saying, "That he could not set a price on them equal to their value." Pliny observes, that this admirable painter, disputing for the prize of painting with Parrhasius, painted some grapes so naturally, that the birds flew down to peck them: Parrhasius, on the other hand, painted a curtain so very artfully, that Zeuxis, mistaking it for a real one, that hid his rival's work, ordered the curtain to be drawn aside, to shew what Parrhasius had done; but having found his mistake, he ingenuously confessed himself vanquished, since he had only imposed upon birds, while Parrhasius had deceived even a master of the art. Another time he painted a boy loaded with grapes; when the birds also flew to this picture,—at which he was vexed, and confessed that his work was not sufficiently finished, since, had he painted the boy as perfectly as the grapes, the birds would have been afraid of him. Archelaus, king of Macedon, made use of Zeuxis's pencil for the embellishment of his palace. One of this painter's finest pieces was a Hercules strangling two Serpents in his Cradle, in the presence of his affrighted Mother; but he himself chiefly esteemed his *Athleta*, or Champion, under which he placed a Greek verse, that afterwards became very famous, and in which he says, "That it was easier to criticize than to imitate the picture." He made a present of his *Alcmena* to the Agrigentines. Zeuxis did not value himself on speedily finishing his pictures; but knowing that Agatharcus gloried in his being able to paint with ease and in a little time, he said, "That for his part, he, on the contrary, gloried in his slowness; and if he was long in painting it was because he painted *for eternity*."

CHAP. IX.

CURIOSITIES RESPECTING MAN.—(*Continued.*)

BIOGRAPHICAL.

Nicholas Pesce—Paul Scarron—Maria Gaetana Agnesi—Anna Maria Schurman—Samuel Bisset, the noted Animal Instructor—John Philip Baratier—Buonaparte.

NICHOLAS PESCE, the first extraordinary character we shall introduce, was a famous diver, of whom F. Kircher gives the following account. "In the time of Frederick king of Sicily, (says Kircher,) lived Nicholas, who, from his amazing skill in swimming, and his perseverance under water, was surnamed the *Fish*. This man had from his infancy been used to the sea; and earned his scanty subsistence by diving for coral and oysters, which he sold to villagers on shore. His long acquaintance with the sea, at last brought it to be almost his natural element. He was frequently known to spend five days in the midst of the waves, without any other provisions than the fish which he caught there, and ate raw. He often swam over from Sicily to Calabria, a tempestuous and dangerous passage, carrying letters from the king. He was frequently known to swim among the gulfs of the Lipari islands, no way apprehensive of danger. Some mariners out at sea, one day observed something at some distance from them, which they regarded as a sea-monster; but, upon its approach, it was known to be Nicholas, whom they took into their ship. When they asked him whither he was going in so strong and rough a sea, and at such a distance from land; he shewed them a packet of letters, which he was carrying to one of the towns of Italy, exactly done up in a leather bag, in such a manner that they could not be wetted by the sea. He kept them thus company for some time in their voyage, conversing and asking questions; and after eating a hearty meal with them, he took his leave, and, jumping into the sea, pursued his voyage alone.

"In order to aid his powers of enduring in the deep, nature seemed to have assisted him in a very extraordinary manner: for the spaces between his fingers and toes were webbed, as in a goose; and his chest became so very capacious, that he could take in at one inspiration as much breath as would serve him for several hours. The account of so extraordinary a person did not fail to reach the king himself; who commanded Nicholas to be brought before him. It was no easy matter to find Nicholas, who generally spent his time in the solitudes of the deep; but, at last, after much searching, he was found,

and brought before his majesty. The curiosity of this monarch had been long excited by the accounts he had heard of the bottom of the gulf of Charybdis. He now, therefore, conceived that it would be a proper opportunity to have more certain information. Accordingly, he commanded our poor diver to examine the bottom of this dreadful whirlpool; and as an incitement to his obedience, he ordered a golden cup to be flung into it. Nicholas was not insensible of the danger to which he was exposed; dangers best known only to himself; and therefore he presumed to remonstrate; but the hopes of the reward, the desire of pleasing the king, and the pleasure of shewing his skill, at last prevailed. He instantly jumped into the gulf, and was as instantly swallowed up in its bosom. He continued for three-quarters of an hour below, during which time the king and his attendants remained on shore, anxious for his fate; but he at last appeared, holding the cup in triumph in one hand, and making his way good among the waves with the other. It may be supposed he was received with applause when he came on shore; the cup was made the reward of his adventure; the king ordered him to be taken proper care of; and, as he was somewhat fatigued and debilitated by his labour, after a hearty meal, he was put to bed, and permitted to refresh himself by sleeping. When his spirits were thus restored, he was again brought, to satisfy the king's curiosity with a narrative of the wonders he had seen, and his account was to the following effect.

"He would never, he said, have obeyed the king's commands, had he been apprised of half the dangers that were before him. These were four things, he said, which rendered the gulf dreadful; not only to men, but to fishes themselves: 1. The great force of the water bursting up from the bottom, which required great strength to resist. 2. The abruptness of the rocks, that on every side threatened destruction. 3. The force of the whirlpool dashing against those rocks. And, 4. The number and magnitude of the polypous fish, some of which appeared as large as a man; and which, every where sticking against the rocks, projected their long and fibrous arms to entangle him. Being asked how he was able so readily to find the cup that had been thrown in, he replied, that it happened to be flung by the waves into the cavity of a rock, against which he himself was urged in his descent.

"This account, however, did not satisfy the king's curiosity. Being requested to venture once more into the gulf for further discoveries, he at first refused; but the king, desirous of having the most exact information possible of all things to be found in the gulf, repeated his solicitations; and, to give them still greater weight, produced a larger cup than the former, and added also a purse of gold. Upon these considerations,

the unfortunate diver once again plunged into the whirlpool, and was never heard of more."

PAUL SCARRON.—This famous French burlesque writer, was the son of a counsellor in parliament, and was born at Paris, about the end of 1610, or beginning of 1611. His father marrying a second wife, he was compelled to assume the ecclesiastical profession. At the age of 24, he visited Italy, and freely indulged in licentious pleasures. After his return to Paris, he persisted in a life of dissipation, till a long and painful disease convinced him that his constitution was almost worn out. At length, when engaged in a party of pleasure, at the age of 27, he lost the use of those legs which had danced so gracefully, and of those hands which once could paint, and play on the lute, with so much elegance.

This happened in the following manner: In 1638 he was attending the carnival at Mentz, of which he was canon. Having dressed himself one day as a savage, his singular appearance excited the curiosity of the children of the town. They followed him in multitudes, and he was obliged to take shelter in a marsh. This wet and cold situation produced a numbness which totally deprived him of the use of his limbs; yet he continued gay and cheerful. He took up his residence in Paris, and by his pleasant humour soon attracted to his house all the men of wit about the city. The loss of his health was followed by the loss of his fortune. On the death of his father he entered into a process with his step-mother; and pleaded his own cause in a ludicrous manner, though his whole fortune depended on the decision. He was unsuccessful, and was ruined. Mademoiselle de Hautefort, compassionating his misfortunes, procured for him an audience of the queen. The poet requested to have the title of Valetudinarian to her majesty: the queen smiled, and Scarron considered the smile as a commission to his new office. Cardinal Mazarine gave him a pension of 500 crowns; but that minister having received disdainfully the dedication of his *Typhon*, the poet immediately wrote a *Mazarinade*, and the pension was withdrawn. He then attached himself to the prince of Condé, and celebrated his victories. He at length formed the extraordinary resolution of marrying, and was accordingly, in 1651, married to Madame d'Aubigne, afterwards celebrated by the name of Maintenon.

At this time (says Voltaire) it was considered as a great acquisition for her to gain for a husband, a man who was disfigured by nature, impotent, and very little enriched by fortune. She restrained by her modesty his indecent buffooneries; and the good company which had formerly resorted to his house, again frequented it. Scarron now became more decent in his manners and conversation; and his gaiety was thus more

agreeable. But he lived with so little economy, that his income was soon reduced to a small annuity, and his marquise of Quinet, *i. e.* the profits of his publications, which were printed by one Quinet. He was accustomed to talk to his superiors with great freedom in his jocular style, as appears from the dedication of his *Don Japhet d'Armenie* to the king. Though Scarron wrote comedies, he had not patience to study the rules of dramatic poetry. Aristotle and Horace, Plautus and Terence, would have frightened him. He saw an open path before him, and he followed it. It was the fashion of the times to pillage the Spanish writers. Scarron was acquainted with that language, and he found it easier to use materials already prepared, than to rack his brain by inventing subjects. As he borrowed liberally from them, a dramatic piece cost him little labour. The great success of his *Jodelet Maitre* was a vast allurements to him. The comedians who acted it, requested more of his productions. They were written with little toil, and they procured him large sums. They also served to amuse him. He dedicated his books to his sister's greyhound bitch. Fouquet gave him a pension of 1600 livres. Christiana, queen of Sweden, having come to Paris, was anxious to see Scarron, "I permit you (said she to Scarron) to fall in love with me. The queen of France has made you her Valetudinarian, and I create you my Roland." Scarron did not long enjoy that title; he was seized with a violent hiccough. He retained his gaiety to his last moment. He died on the 14th of October, 1660, aged 51. His works have been collected, and published by Bruzen de la Martiniere, in 10 vols. 12mo. 1737. His Comic Romance, in prose, merits attention. It is written with much humour and purity of style, and contributed to the improvement of the French language. It had a prodigious run; it was the only one of his works that Boileau could submit to read. Scarron can raise a laugh on the most serious subjects; but his sallies are rather those of a buffoon, than the effusions of ingenuity and taste. He is continually falling into the mean and the obscene. Sterne seems to have imitated Scarron in his *Tristram Shandy*.

We shall now introduce two female characters of note. The first is MARIA GAETANA AGNESI, a lady of extraordinary genius, and most extensive acquirements, who was born at Milan, on the 16th of May, 1718. Her father, Pietro Agnesi, of Milan, was royal feudatory of Montevaglia, and its dependencies; and being a man of some rank and consequence, he was disposed, from paternal affection, to provide suitably for the education of his infant daughter, who gave the most striking indications of talent. From her tenderest years, she dis-

discovered a wonderful aptness, and a vehement desire, for acquiring languages. Under the direction of proper masters, she studied at the very same time the Latin and Greek, the French and German; and while the rapidity of her progress excited astonishment, such were the prodigious powers of her memory, that she could easily pursue those diversified objects without feeling the smallest degree of confusion. When yet scarcely nine years old, this surprising child delivered a Latin oration, to prove that the cultivation of letters is not inconsistent with the female character,—before an assembly of learned persons, invited to her father's house.

At the age of eleven, the young Agnesi could not only read Greek, and translate it instantly into Latin, but could even speak that refined language with the same apparent ease and fluency as if it had been her native tongue. Nor did these acquisitions absorb her whole attention; a nobler field was opened to the exercise of her mental faculties. She now began to read Euclid's Elements, and proceeded in algebra as far as quadratic equations. Thus prepared, she advanced with ardour to the study of natural philosophy; but not content with the sober proofs there unfolded, she soared to the height of metaphysics, and engaged in the most abstruse and intricate disquisitions of that contentious science. After this young lady had attained the age of 14, her father, anxious to forward her ardour for improvement, and willing to gratify her ambition for literary distinction, invited occasionally to his house a number of persons, the most respectable in Milan for their rank and learning. In the midst of this grave auditory, Donna Agnesi made her appearance; and, without resigning the native delicacy of her sex, she maintained a succession of new theses on various difficult parts of philosophy, and handled the arguments with such dexterity, and commanding eloquence, as singly to vanquish every opponent that entered the field of controversy. These disputations were all of them carried on in the Latin language, which she spoke with the utmost ease, purity, and copious elegance. Every thing conspired to heighten the impression produced on the admiring spectators. In the full bloom of youth, her person agreeable, her manner graceful, an air of gentleness and modesty gave irresistible charms to her whole demeanour. Such, for several years, was the great theatre of her glory. But having nearly completed the circle of philosophy, and exhausted the chief topics of discussion, she resolved at length to close that career with a solemnity suitable to the occasion.

In the year 1738, Agnesi made her last brilliant display, before an august assembly, composed of the most learned and illustrious of the Milanese nobility, the senators, and foreign

ministers, with the most distinguished professors in all the branches of science and literature. The substance of these philosophical conferences was afterwards published in a quarto volume, entitled, "*Propositiones Philosophicæ, quas, crebris Disputationibus domi habitis, coram clarissimis viris, explicabat extempore, et ab objectis vindicabat Maria Cajetana de Agnesi Mediolanensis.*" Agnesi now bent her whole attention to the culture of mathematics; and, without guide or assistance, she composed a very useful commentary on L'Hospital's Conic Sections, which is said to exist still in manuscript. In the sublimer departments of that science, her studies were directed by the matured experience of Rampinelli, professor of mathematics in the university of Pisa; but she soon gave proofs of her amazing proficiency, in digesting a complete body of the modern calculus. This excellent work, entitled, "Analytical Institutions, for the Use of the Italian Youth," appeared in 1748, in two volumes quarto, and was highly esteemed by the best judges, and justly regarded as exhibiting the fullest and clearest view of the state of the science at that period. She was, in consequence, elected by acclamation a member of the Institute of Sciences of Bologna; and the pope farther conferred on her the title of Professor of Mathematics in the university of that city.

But Agnesi was already sated with literary fame. That sun, which in its ascent had shone forth with such dazzling radiance, was, through the rest of its course, shrouded in clouds and darkness. The fever of genius had preyed on her mind, and the high fit of excitement was quickly succeeded by a hopeless depression of spirits. She repelled the seductions of human learning, and abandoned for ever her favourite mathematical pursuits. Renouncing the vanities of this world, she withdrew from society, embraced a life of religious seclusion, and sunk by degrees into the languor of religious melancholy. She studied nothing but Hebrew, and the rhapsodies of the Greek fathers of the church. For upwards of twenty years she denied all access to strangers. The famous Lalande complains, in his "Travels through Italy," that he was not allowed the honour of visiting that prodigy; and Father Boscovick himself, whose religious principles must have been unexceptionable, experienced, notwithstanding his repeated importunities, a similar refusal. Indulging that gloomy temper, she retired into a convent, and assumed the habit of a Blue Nun. She sought to forget the world, and was herself forgotten. She died about the year 1770. The *Inshhizioni Analytiche* of Agnesi were translated into English, many years ago, by Mr. Colson, Lucasian professor of mathematics at Cambridge. The translation was discovered among the papers of that ingenious mathematician, by the learned Baron Mase-



PAUL SCARRON



SAMUEL BISSET.



MARIA GAETANA AGNESI.



ANNA MARIA SCHURMAN

rea, who put the manuscript into the hands of Mr. Hellins, as editor, and generously defrayed the expenses attending the publication.

ANNA MARIA SCHURMAN, the other distinguished female character, was born at Cologne, 1607, of parents sprung from noble Protestant families. From her infancy she discovered an uncommon dexterity of hand; for, at six years of age, she cut with her scissors all sorts of figures upon paper, without any pattern or model. At eight, she learned in a few days to design flowers in a very agreeable manner; and two years after, took no more than three hours in learning to embroider. She was afterwards instructed in music, painting, sculpture, and engraving; and succeeded to admiration in all these arts. Her hand-writing in all languages was inimitable; and some curious persons have preserved specimens of it in their cabinets. Mr. Joby, in his journey to Munster, relates, that he had a view of the beauty of her writing in French, Greek, Hebrew, Syriac, and Arabic; and was an eye-witness of her skill in drawing in miniature, and making portraits upon glass with the point of a diamond. She painted her own picture; and made artificial pearls, so nearly resembling natural ones, that they could not be distinguished, except by pricking them with a needle.

The powers of her understanding were equally capacious; for, at eleven years of age, when her brothers were examined in their Latin exercises, she frequently whispered them what to answer, though she had only heard them say their lessons *en passant*, which her father observing, and perceiving she had a genius for literature, determined to cultivate those talents he saw she was possessed of, and accordingly assisted her in gaining that noble stock of learning, for which she was afterwards so eminent. The Latin, Greek, and Hebrew languages were so familiar to her, that she not only wrote, but spoke them fluently, to the surprise of the most learned men. She made a great progress also in the Oriental languages which had an affinity with the Hebrew, as the Syriac, Chaldee, Arabic, and Ethiopic; understood the living languages perfectly well, and could converse readily in French, English, and Italian. She was likewise competently versed in geography, astronomy, philosophy, and the sciences; but as her mind was naturally of a religious cast, these learned amusements gave her but little satisfaction; and at length she applied herself to divinity, and the study of the holy scriptures.

While she was an infant, her father had settled at Utrecht, but afterwards, for the more convenient education of his children, removed to Praneker, where he died 1623. Upon which his widow returned to Utrecht, where Anna Maria continued

her studies very intensely; which undoubtedly kept her from marrying, as she might advantageously have done with Mr. Cotts, pensionary of Holland, and a celebrated poet, who wrote verses in her praise, when she was no more than fourteen years of age.

Her modesty, which was as remarkable as her knowledge, would have kept her merit and learning in obscurity, if Rivetus, Spanheim, and Vossius, had not produced her, contrary to her own inclination, upon the stage of the world. To these three divines we may add Salmasius, Beveronicus, and Huygens, who maintained a literary correspondence with her, and, by shewing her letters, spread her fame into foreign countries. This procured her letters from eminent men; and her name became so famous, that persons of the first distinction, even princesses, paid her visits; and cardinal Richelieu shewed her marks of his esteem.

About the year 1650, she made a visible alteration in her religious system. She no longer went to public worship, but performed her devotions in private; which occasioned a report that she was inclined to popery: but the truth was, she had attached herself to Labadie, the famous Quietist, and embracing his principles and practices, accompanied him wherever he went. She lived some time with him at Altena, in Holstein, where she attended him at his death in 1674. She afterwards retired to Weimart, in Friesland, where Mr. William Penn, the quaker, visited her in 1677; and died at this place, 1678. She took for her device these words of St. Ignatius, *Amor meus crucifixus est*, My Love is crucified.

SAMUEL BISSET, the noted animal instructor, next follows.—A most singular character, famous for teaching quadrupeds to perform very remarkable actions. He was born at Perth, in 1721. He first tried his skill on a horse and a dog which he bought in London, and he succeeded beyond all expectation. Two monkeys were the next pupils he took in hand; one of these he taught to dance and tumble on the rope, whilst the other held a candle with one paw for his companion, and with the other played a barrel organ. These antic animals he also instructed to play several fanciful tricks, such as drinking to the company, riding and tumbling upon the horse's back, and going through several regular dances with the dog.

Being a man of unwearied patience, three young cats were the next objects of his tuition. He taught those domestic tigers, to strike their paws in such directions on the dulcimer, as to produce several tunes, having music-books before them, and squalling at the same time in different keys or tones, first, second, and third, by way of concert. In such a city as London, these feats could not fail of exciting attention. The well-known Cat's Opera was performed at the Haymarket; the

horse, the dog, the monkeys, and the cats, went through their several parts with uncommon applause, to crowded houses; and in a few days Bisset found himself in possession of nearly a thousand pounds to reward his ingenuity.

This success excited a desire of extending his dominion over other animals, including even the feathered kind. He procured a leveret, and reared it to beat several marches on the drum with its hind-legs, until it became a good stout hare. This creature, which is always set down as the most timid, he declared to be as mischievous and bold an animal, to the extent of its power, as any with which he was acquainted. He taught canary-birds, linnets, and sparrows, to spell the name of any person in company, to distinguish the hour and minute of time, and play many other surprising tricks; he trained six turkey cocks to go through a regular country dance. In the course of six months' teaching, he made a turtle fetch and carry like a dog; and having chalked the floor, and blackened his claws, could direct it to trace out any given name in the company.

The following is a surprising instance of premature genius, in the person of JOHN PHILIP BARATIER. A most extraordinary person, born 1721, in the margravate of Anspach, of such extraordinary powers of memory, that, at the age of four, he conversed with his mother in French, with his father in Latin, and with his servants in German. The rapidity of his improvement augmented with his years, so that he became acquainted with Greek at six; with Hebrew at eight, and in his eleventh year translated from the Hebrew into French the *Travels of Benjamin of Tudela*, which he enriched with valuable annotations. His proficiency in mathematics was so great, that he submitted to the London Royal Society, a scheme for finding the longitude, which, though insufficient, exhibited the strongest marks of superior abilities. He visited Halle with his father in 1735, where he was offered by the university the degree of M. A. The young philosopher drew up 14 theses, which he printed, and the next morning disputed upon them with such logical precision, that he astonished a most crowded audience. At Berlin he was received with kindness by the king of Prussia, and honoured with marks of distinction. His abilities, however, shone but like a meteor: a constitution, naturally delicate, was rendered still more weak by excessive application; and a cough, spitting of blood, and fever on the spirits, put an end to his life at Halle, 1740, in his 20th year.

Baratier is mentioned as a prodigy of learning and of genius; his memory was universally retentive, and his application scarcely credible, when it is recollected that he spent twelve hours in bed till his tenth year, and ten afterwards. In one

winter he read twenty great folios, with all the attention of a vast comprehensive mind; and the large work which he prepared on Egyptian antiquities, shewed the most judicious and laborious arrangement. In his domestic economy he was very temperate; he ate little flesh, lived totally on milk, tea, bread, and fruit; he disliked wine; he had an aversion to dancing, music, and the sports of the field; so that he wished for no recreation from study, but in walking, or in the conversation of a few friends.

We shall conclude this chapter with an account of the principal events in the life of—

BONAPARTE.—1769, Born at Ajaccio, Corsica, Aug. 15.—1779, Placed at the Military School of Brienne, March.—1794, An Officer of artillery at the siege of Toulon, and appointed General of Brigade.—1794, Commands the Conventional Troops, and defeats the Parisians, Oct. 4.—1796, Appointed to the command of the Army of Italy. Battle of Lodi, May 10. Battle of Castiglione, Aug. 3. Battle of Arcola, Nov. 16.—1797, Surrender of Mantua, Feb. 2. Trieste surrenders, March 23. Preliminaries with Austria signed at Leoben, April 18. French take possession of Venice, May 16. Treaty of Campo Formeo, with Austria, 17.—1798, Buonaparte sails for Egypt, May 20. Battle of Embabe, or of the Pyramids, July 21. Insurrection at Cairo, Oct. 24.—1799, Siege of Acre raised, May 21. Sails from Egypt for France, Aug. 23. Lands at Frejus, Oct. 7. Dissolves the Conventional Government, Nov. 9. Declared First Consul, 10.—1800, Peace with the Chouans, Feb. 15. Buonaparte crosses Mount St. Bernard, May. Battle of Marengo, June 16. Preliminaries with Austria signed at Paris. Battle of Hohenlinden, Dec. 3. Explosion of the Infernal Machine, 24.—1801, Treaty of Luneville with Austria, Feb. 9. Nelson attacks the Buologne Flotilla, Aug. 16. Preliminaries with England, Oct. 8.—1802, The Cisalpine Republic placed under Buonaparte, Jan. 26. Definitive Treaty with England, March 27. Legion of Honour instituted, May 15. Declared Consul for Life, Aug. 2. Swiss form of Government changed by the interference of the French, 28.—1803, English Declaration of War, May 18. Hanover conquered, June 5.—1804, Moreau arrested, Feb. Duc D'Enghien shot, March 20. Pichegru dies in Prison, April 8. Buonaparte made Emperor, May 18. Crowned by the Pope, Nov. 19.—1805, Writes a pacific letter to the King of England, Feb. Treaty of Petersburgh, between England, Russia, Austria, and Sweden, April 11. Buonaparte declared King of Italy, May 26. Buonaparte heads his army against Austria, Sept. 24. Mack's army surrenders at Ulm, Oct. 20. French enter Vienna, Nov. 13. Battle of Austerlitz, Dec. 2. Treaty of Vienna with Prussia,

15. Treaty of Presburg with Austria, 26.—1806, Joseph Buonaparte declared King of Naples, March 30. Louis Buonaparte declared King of Holland, June 5. Convocation of the Jews, July 26. Confederation of the Rhine published, 27. Buonaparte marches against Prussia, Sept. 24. Battle of Auerstadt, or Jena, Oct. 14. Buonaparte enters Berlin, 27. Hamburg taken, Nov. 19. Berlin Decree.—1807, Battle of Eylau, Feb. 8. Battle of Friedland, June 14. Treaty of Tilsit, July 7.—1808, Joseph Buonaparte declared King of Spain, July 7. Surrender of Dupont's army at Baylen, 20. Joseph Buonaparte evacuates Madrid, 29. Battle of Vimeira, August 21. Conferences at Erfurth, Sept. 20. Buonaparte arrives at Vittoria, Nov. 5. Surrender of Madrid, Dec. 4.—1809, Battle of Corunna, Jan. 16. Buonaparte returns to Paris, 22. War declared by Austria, April 6. Buonaparte heads his army against Austria, 13. French enter Vienna, May 10. Battle of Essling, or Asperne, 22. Battle of Wagram, July 6. Flushing taken by the English, August 14. Treaty of Vienna, Oct. 14. Lucien Buonaparte arrives in England, Dec. 13. Buonaparte's marriage with Josephine dissolved, 16. Walcheren evacuated by the English, 23.—1810, Buonaparte marries Maria Louisa, daughter of Francis II. March 11. Holland and the Hanse Towns annexed to France, July 9. Bernadotte elected Crown Prince of Sweden, Aug. 21. Decree for restraining the liberty of the Press, Dec.—1811, Hamburg annexed to the empire, Jan. 1. The Empress delivered of a son, who is styled King of Rome, April 20. Buonaparte present at an engagement between the Boulogne flotilla and an English cruiser, Sept. 2.—1812, Swedish Pomerania seized by Buonaparte, Jan. 22. He heads the army against Russia, May 2. Arrives at Konigsberg, June 11. Enters Wilna, 28. Smolensko taken, Aug. 18. Battle of Moskwa, Sept. 7. French enter Moskow, 14. Evacuate it, October 22. Buonaparte at Smolensko, Nov. 9. Deserts the army, Dec. 5. Arrives at Paris, 18.—1813, Takes the command of the army on the Elbe, April. Battle of Lutzen, May 1. Battle of Bautzen, 20. Armistice agreed on, June 4. Battle of Vittoria, 21. Hostilities re-commence, Aug. 17. Battle of Dresden, Moreau killed, 28. English enter France, Sept. 7. Buonaparte evacuates Dresden, 28. Battle of Leipsic, Oct. 18. Revolution in Holland, Nov. 15. Declaration of the Allies at Frankfort, Dec. 1. English army cross the Nive, 8.—1814, Allies cross the Rhine, Jan. 4. Battle of Montmartre, March 30. Allies enter Paris, 31. Buonaparte abdicates the throne, April 11. Arrives at Elba, May 8.—1815, Sails from Elba to France, March 1. Arrives at Paris, and reascends the throne, 20. Is declared an outlaw by the Sovereigns of Europe then assembled at Vienna, 25. Calls a new House of Peers and

Chamber of Representatives of the people. Calls a Champ de Mai, April. Defeats the Prussians, June 16. Loses his army in the great battle of Waterloo, 18. Abdicates the throne a second time, 21. Surrenders himself to Capt. Maitland, commanding the English ship of war, the Bellerophon, in Basque Roads, July 15. Arrives at Torbay, 22. Sailed from England in the Northumberland, for St. Helena, Aug. 11—1821; Died at St. Helena, May 5. Buried there, 9.

CHAP. X.

CURIOSITIES RESPECTING MAN.—(*Continued.*)

RICHARD SAVAGE, one of the most extraordinary characters that is to be met with in all the records of biography, was the son of Anne, countess of Macclesfield, by the earl of Rivers, according to her own confession; and was born in 1698. This confession of adultery was made, to procure a separation from her husband, the earl of Macclesfield: yet, having obtained this end, no sooner was a spurious offspring brought into the world, than she resolved to disown him; and, as long as he lived, she treated him with the most unnatural cruelty. She delivered him over to a poor woman to educate as her own; maliciously prevented the earl of Rivers from leaving him a legacy of £6000, by declaring him dead; and deprived him of another legacy which his god-mother, Mrs. Lloyd, had left him, by concealing from him his birth, and thereby rendering it impossible for him to prosecute his claim. She endeavoured to send him secretly to the plantations; but this plan being frustrated, she placed him apprentice with a shoemaker. In this situation, however, he did not long continue; for his nurse dying, he went to take care of the effects of his supposed mother, and found in her boxes some letters, which discovered to young Savage his birth, and the cause of its concealment. From the moment of this discovery he became dissatisfied. He conceived that he had a right to share in the affluence of his real mother; and therefore he applied to her, and tried every art to attract her regard. But in vain did he solicit this unnatural parent; she avoided him with the utmost precaution, and took measures to prevent his ever entering her house. Meantime, while he was endeavouring to rouse the affections of a mother, in whom all natural affection was extinct, he was destitute of the means of support. Having a strong inclination to literary pursuits, especially poetry, he wrote poems; and

afterwards two plays, *Woman's a Riddle*, and, *Love in a Veil*: he was allowed no part of the profits from the first; but by the second he acquired the acquaintance of Sir Richard Steel and Mr. Wilkes, by whom he was pitied, caressed, and relieved. But the kindness of his friends not affording him a constant supply, he wrote the tragedy of *Sir Thomas Overbury*; which not only procured him the esteem of many persons of wit, but brought him £200. The celebrated Aaron Hill, Esq. was of great service to him in correcting and fitting this piece for the stage and the press; and extended his patronage still farther. But Savage was, like many other wits, a bad economist. As fast as his friends raised him out of one difficulty, he sunk into another; and when he found himself greatly involved, he rambled about like a vagabond, with scarcely a shirt on his back. He was in one of these situations all the time he wrote his tragedy above mentioned; without a lodging, and often without a dinner. Mr. Hill also promoted a subscription to a volume of his *Miscellanies*, and furnished part of the poems of which it was composed. To this *Miscellany* Savage wrote a preface, in which he gives an account of his mother's cruelty, in a very uncommon strain of humour. The profits of his tragedy and his *Miscellanies* had now somewhat raised him, both in circumstances and credit, so that the world began to behold him with a more favourable eye, when both his fame and life were endangered by a most unhappy event: a drunken frolic, in which he one night engaged, ended in a fray, and Savage unfortunately killed a man, for which he was condemned to be hanged: his friends earnestly solicited the mercy of the crown, while his mother as earnestly exerted herself to prevent his receiving it. The Countess of Hertford, at length, laid his whole case before Queen Caroline, and Savage obtained a pardon. Savage now lost that affection for his mother which the whole series of her cruelty had not been able wholly to repress; and considering her as an implacable enemy, whom nothing but his blood could satisfy, threatened to harass her with lampoons, and to publish a copious narrative of her conduct, unless she consented to allow him a pension. This expedient proved successful; and Lord Tyrconnel, upon his promise of laying aside his design of exposing his mother's cruelty, took him into his family, treated him as an equal, and engaged to allow him a pension of £200 a year. This was the happy period of Savage's life. He was courted by all who wished to be thought men of genius and taste. At this time he published the *Temple of Health and Mirth*, on the recovery of Lady Tyrconnel from a languishing illness; and the *Wanderer*, a moral poem, which he dedicated to Lord Tyrconnel, in strains of the highest panegyric: but these praises he soon was inclined to retract,

being discarded by the man on whom they were bestowed. Of this quarrel, Lord Tyrconnel and Mr. Savage gave very different accounts. But our author's conduct was ever such as made all his friends, sooner or later, grow weary of him, and even forced most of them to become his enemies.

Being thus once more turned adrift upon the world, Savage, whose passions were very strong, and whose gratitude was very small, exposed the faults of Lord Tyrconnel. He also took revenge upon his mother, by publishing the *Bastard*, a poem, remarkable for the vivacity of its beginning (where he humorously enumerates the imaginary advantages of base birth;) and for the pathetic conclusion, wherein he recounts the real calamities which he suffered by the crime of his parents. The following lines, in the opening of the poem, are a specimen of this writer's spirit and versification :

“Blest be the bastard's birth! thro' wondrous ways
He shines eccentric, like a comet's blaze.
No sickly fruit of faint compliance he;
He! stamp'd in nature's mint with ecstasy!
He lives to build, not boast, a generous race;
No tenth transmitter of a foolish face.
He, kindling from within, requires no flame;
He glories in a bastard's glowing name.
Nature's unbounded son, he stands alone,
His heart unbiass'd, and his mind his own.
O mother! yet no mother!—'tis to you
My thanks for some distinguish'd claims are due.”

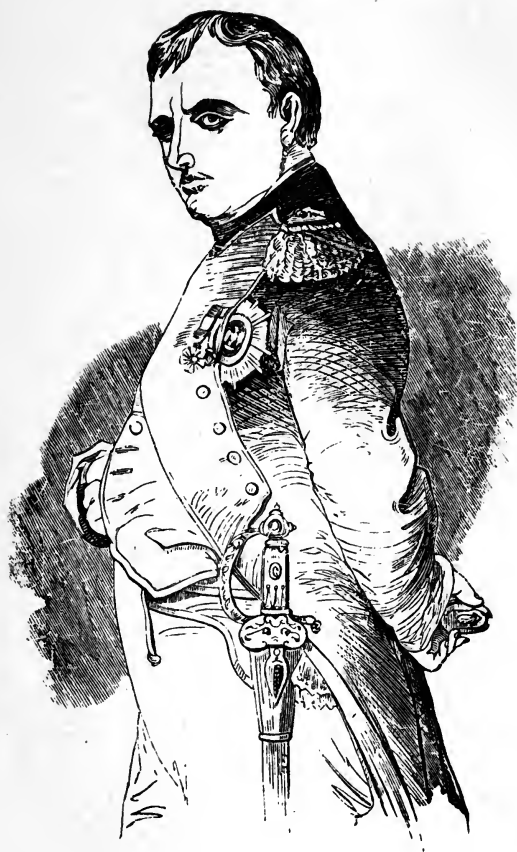
This poem had an extraordinary sale; and its appearance happening at the time when his mother was at Bath, many persons there repeated passages from it in her hearing. This was perhaps the first time that ever she discovered a sense of shame, and, on this occasion, the power of wit was very conspicuous. The wretch, who had without scruple proclaimed herself an adulteress, and who had first endeavoured to starve her son, then to transport him, and afterwards to hang him, was not able to bear the representation of her own conduct, but fled from reproach, though she felt no pain from guilt; and left Bath in haste, to shelter herself among the crowds of London. Some time after this, Savage formed the resolution of applying to the Queen; who, having once given him life, he hoped she might extend her goodness to him, by enabling him to support it. With this view, he published a poem on her birth-day, which he entitled *The Volunteer Laureat*; for which she was pleased to send him £50, accompanied with an intimation that he might annually expect the same bounty. But this annual allowance was nothing to a man of his strange and singular extravagance. His usual custom was, as soon as he had received his pension, to disappear with it, and secrete himself from his most intimate friends, till every



RICHARD SAVAGE.



WILLIAM HUNTINGTON.



NAPOLÉON.

Napoleon

shilling of it was spent ; which done, he again appeared penniless as before : but he would never inform any person where he had been, nor in what manner his money had been dissipated. From the reports, however, of some who penetrated his haunts, he expended both his time and his cash in the most sordid and despicable sensuality ; particularly in eating and drinking, in which he would indulge in the most unsocial manner, sitting whole days and nights by himself, in obscure houses of entertainment, over his bottle and trencher, immersed in filth and sloth, with scarcely decent apparel ; generally wrapped up in a horseman's great coat ; and, on the whole, with his very homely countenance, exhibiting an object the most disgusting to the sight, if not to some other of the senses.

His wit and parts, however, still raised him new friends, as fast as his misbehaviour lost him his old ones. Yet such was his conduct, that occasional relief only furnished the means of occasional excess ; and he defeated all attempts made by his friends to fix him in a decent way. He was even reduced so low as to be destitute of a lodging ; insomuch that he often passed his nights in those mean houses that are set open for casual wanderers ; sometimes in cellars, amidst the riot and filth of the most profligate of the rabble ; and not seldom would he walk the streets till he was weary, and then lie down, in summer, on a bulk,—or, in winter, with his associates, among the ashes of a glasshouse. Yet, amidst all his penury and wretchedness, this man had so much pride, and so high an opinion of his own merit, that he was always ready to repress, with scorn and contempt, the least appearance of any slight towards himself, in the behaviour of his acquaintance ; among whom he looked upon none as his superior. He would be treated as an equal, even by persons of the highest rank. He once refused to wait upon a gentleman, who was desirous of relieving him, when at the lowest distress, only because the message signified the gentleman's desire to see him at nine in the morning. His life was rendered still more unhappy, by the death of the Queen, in 1738. His pension was discontinued ; and the insolent manner in which he demanded of Sir Robert Walpole to have it restored, for ever cut off his supply, which probably might have been recovered by proper application.

His distress now became so notorious, that a scheme was at length concerted for procuring him a permanent relief. It was proposed that he should retire into Wales, with an allowance of £50 a year, on which he was to live privately, in a cheap place, for ever quitting his town haunts, and resigning all farther pretensions to fame. This offer he seemed gladly to accept ; but his intentions were only to deceive his friends, by retiring for awhile to write another tragedy, and

then to return with it to London. In 1739, he set out for Swanséy, in the Bristol stage-coach, and was furnished with 15 guineas, to bear the expense of his journey. But, on the 14th day of his departure, his friends and benefactors, the principal of whom was Mr. Pope, who expected to hear of his arrival in Wales, were surprised with a letter from Savage, informing them that he was yet upon the road, and could not proceed for want of money. There was no other remedy than a remittance, which was sent him, and by the help of which he was enabled to reach Bristol, whence he was to proceed to Swansea by water. At Bristol, however, he found an embargo laid upon the shipping; so that he could not immediately obtain a passage. Here, therefore, being obliged to stay for some time, he so ingratiated himself with the principal inhabitants, that he was often invited to their houses, distinguished at their public entertainments, and treated with a regard that highly gratified his vanity. At length, with great reluctance, he proceeded to Swansea; where he lived about a year, very much dissatisfied with the diminution of his salary, for he had, in his letters, treated his contributors so insolently, that most of them withdrew their subscriptions. Here he finished his tragedy, and resolved to return with it to London; which was strenuously opposed by his constant friend Mr. Pope; who proposed that Savage should put this play into the hands of Mr. Thomson and Mr. Mallet, that they might fit it for the stage; that his friends should receive the profits it might bring in; and that the author should receive the produce by way of annuity. This kind and prudent scheme was rejected by Savage with contempt. He declared he would not submit his works to any one's correction; and that he would no longer be kept in leading-strings. Accordingly, he soon returned to Bristol, in his way to London; but at Bristol, meeting with a repetition of the same kind treatment he had before found there, he was tempted to make a second stay in that opulent city for some time. Here he was not only caressed and treated, but the sum of £30 was raised for him; with which it would have been happy if he had immediately departed for London. But he never considered that a frequent repetition of such kindness was not to be expected. In short, he remained here till his company was no longer welcome. His visits in every family were too often repeated, his wit had lost its novelty, and his irregular behaviour grew troublesome. Necessity came upon him before he was aware; his money was spent, his clothes were worn out, his appearance was shabby, and his presence was disgusting at every table. He now began to find every man from home at whose house he called, and he found it difficult to obtain a dinner.

Thus reduced, it would have been prudent in him to have

withdrawn from the place; but prudence and Savage were never acquainted. He staid, in the midst of poverty, hunger, and contempt, till the mistress of a coffee-house, to whom he owed about 8*l.* arrested him for the debt. He remained for some time at the house of the sheriff's officer, in hopes of procuring bail; which expense he was enabled to defray by a present of five guineas from Mr. Nash at Bath. No bail, however, was to be found; so that poor Savage was at last lodged in Newgate, a prison in Bristol. But it was the fortune of this extraordinary mortal always to find more friends than he deserved. The keeper of the prison took compassion on him, and greatly softened the rigours of his confinement by every kind of indulgence; he supported him at his own table, gave him a commodious room to himself, allowed him to stand at the door of the gaol, and often took him into the fields for the benefit of the air and exercise; so that, in reality, Savage endured fewer hardships here than he had usually suffered during the greatest part of his life.

While he remained in this agreeable prison, his ingratitude again broke out, in a bitter satire on the city of Bristol; to which he certainly owed great obligations, notwithstanding his arrest, which was but the lawful act of an individual. This satire is entitled, *London and Bristol delineated*; and in it he abused the inhabitants of the latter with such a spirit of resentment, that the reader would imagine he had never received any other than the worst of treatment in that city. When Savage had remained about six months in this hospitable prison, he received a letter from Mr. Pope, (who still allowed him £20 a year,) containing a charge of very atrocious ingratitude; and though the particulars have not transpired, yet, from the notorious character of the man, there is reason to fear that Savage was but too justly accused: He, however, solemnly protested his innocence; but he was very unusually affected on this occasion:—in a few days after, he was seized with a disorder, which, at first, was not suspected to be dangerous; but growing daily more languid and dejected, at last a fever seized him, and he died on the 1st of August, 1743, in the 46th year of his age.

Thus lived, and thus died, Richard Savage, Esq. leaving behind him a character strangely chequered with vices and good qualities. Of the former we have mentioned a variety of instances; of the latter, his peculiar situation in the world gave him but few opportunities of making any considerable display. He was, however, undoubtedly a man of excellent parts; and had he received the full benefits of a liberal education, and had his natural talents been cultivated to the best advantage, he might have made a respectable figure in life. He was happy in a quick discernment, a retentive memory,

and a lively flow of wit, which made his company much coveted; nor was his judgment of men and writings inferior to his wit: but he was too much a slave to his passions, and his passions were too easily excited. He was warm in his friendships, but implacable in his enmity; and his greatest fault was ingratitude. He seemed to think every thing due to his merit, and that he was little obliged to any one for those favours which he thought it their duty to confer upon him. He therefore never rightly estimated the kindness of his many friends and benefactors, or preserved a grateful sense of their generosity towards him. The works of this original writer, after having long lain dispersed in magazines and fugitive publications, were collected and published in an elegant edition, in 2 vols. 8vo. to which are prefixed the admirable *Memoirs of Savage*, written by Dr. Samuel Johnson.



CHAP. XI.

CURIOSITIES RESPECTING MAN.—(*Concluded.*)

WILLIAM HUNTINGDON, a very eccentric personage, who was originally a coal-heaver, and afterwards became a popular preacher of the Calvinistic persuasion. The following account, formed principally from the preacher's own words, was first presented to the public in the first volume of "*The Pulpit*," 1809. Excepting the circumstance of enlarging his name from Hunt to Huntingdon, which is stated as one of the inevitable consequences of "the follies of his youth," Mr. Huntingdon has already written, with tolerable truth, the greater portion of the history of himself.

He was born, he says; in the Weald of Kent; and "suffered much from his parents' poverty, when young. He long felt other disadvantages attending his birth. Being born in "none of the most polite parts of the world," he "retained a good deal of his provincial dialect;" so that many of his expressions sounded very harsh and uncouth." Of this he complains, with some cause, as it afterwards occasioned numbers of "unsanctified critics to laugh and cavil at" him. He was first an errand boy, then a daily labourer, then a cobbler; and, though he "worked by day," and "cobbled by night," he, at one time, "lived upon barley." His first ministerial preparation is thus told:

"I had now (says Mr. H.) five times a week to preach constantly: on which account I was forced to lay the Bible in a chair by me, and now and then read a little, in order to furnish myself with matter for the pulpit. It sometimes hap-

pened that I was under sore temptations and desertions. the Bible, too, appeared a sealed book; insomuch that I could not furnish myself with a text; nor durst I leave my work in order to study or read the Bible; if I did, my little ones would soon want bread; my business would also run very cross at those times." His earnings did not then amount to more than eight shillings per week. Even when his state grew better, when he got his first "parsonic livery" on his back, he could not study at his ease. "My little cot (he says) was placed in a very vulgar neighbourhood, and the windows were so very low, that I could not study at any of them, without being exposed to the view of my enemies; who often threw stones through the glass, or saluted me with a volley of oaths or imprecations." This must have been painful enough to one whose "memory was naturally bad." Providence had long furnished him with very superior accommodations. After many years of itinerant and irregular preaching, William Huntingdon, weary of living at Thames Ditton, secretly longed to leave it, fully persuaded that he "should end his ministry in London."

"Having unsuccessfully laboured in the vineyard of the country," and as he "did not see that God had any thing more for him to do there," he, like one Durant of late, "saw the Lord himself open the door" for his removal. He had resolved to be off; and he contrived to get off. He was now, as he himself says, "to perch upon the thick boughs." Ditton was to be left for London. Yet had poor Ditton not been so unkind to him. "Some few years before I was married," says Mr. H. "all my personal effects used to be carried in my hand, or on my shoulders, in one or two large handkerchiefs; but after marriage, for some few years, I used to carry all the goods that we had gotten, on my shoulders, in a large sack: but when we removed from Thames Ditton to London, we loaded two large carts with furniture and other necessities; besides a post-chaise, well filled with children and cats"

Being viewed as ludicrous while in the country, he was fearful of being considered as ridiculous elsewhere. I here transcribe his words: "At this (says Mr. H.—having been advertised in Margaret-street Chapel,) I was sorely offended, being very much averse to preaching in London, for several reasons. First, because I had been told it abounded so much with all sorts of errors, that I was afraid of falling into them, there were so many that lay in wait to deceive. Secondly, because I had no learning, and therefore feared I should not be able to deliver myself with any degree of propriety; and as I knew nothing of Greek or Hebrew, nor even of the English Grammar, that I should be exposed to the scourging tongue of every critic in London."

"During many weeks, (he adds,) I laboured under much distress of mind respecting my want of abilities to preach in this great metropolis." I think this one of the few rational passages to be found in the "Bank of Faith." Mr. Huntingdon here candidly confesses his own conviction of his then ministerial incompetency, and expresses his apprehension as to the probable nullity of his divine mission. His call seems to fail him now. He feels just as most men would feel in the same state,—fears just as they would fear,—and takes the same chance as to the great end he had in view. "During the space of three years, (says Mr. Huntingdon,) I secretly wished in my soul, that God would favour me with a chapel of my own, being sick of the errors that were perpetually broached by some one or other in Margaret-street Chapel, where I then preached. But though I so much desired this, yet I could not ask God for such a favour, thinking it was not to be brought about by one so very mean, low, and poor as myself. However, God sent a person, unknown to me, to look at a certain spot, who afterwards took me to look at it; but I trembled at the very thought of such an immense undertaking. Then God stirred up a wise man to offer to build a chapel, and to manage the whole work without fee or reward. God drew the pattern on his imagination, while he was hearing me preach a sermon. I then took the ground; this person executed the plan; and the chapel sprung up like a mushroom. As soon as it was finished, this precious scripture came sweet to my soul, 'He will fulfil the desire of them that fear him:' Psal. cxlv. 19.

"I will now inform my reader of the kind providence of my God at the time of building the chapel, which I named Providence Chapel (1788); and also mention a few free-will-offerings which the people brought. They first offered about eleven pounds, and laid it on the foundation at the beginning of the building. A good gentleman, with whom I had but little acquaintance, and of whom I bought a load of timber, sent it in with a bill and receipt-in-full, as a present to the Chapel of Providence. Another good man came with tears in his eyes, and blessed me, and desired to paint my pulpit, desk, &c. as a present to the chapel. Another person gave half a dozen chairs for the vestry; and my friends, Mr. and Mrs. Lyon, furnished me with a tea-chest, well stored, and a set of china. My good friends, Mr. and Mrs. Smith, furnished me with a very handsome bed, bedstead, and all its furniture and necessaries, that I might not be under the necessity of walking home in the cold winter nights. A daughter of mine in the faith, gave me a looking-glass for my chapel study. Another friend gave me my pulpit-cushion, and a book-case for my study. Another gave me a book-case for the vestry. And

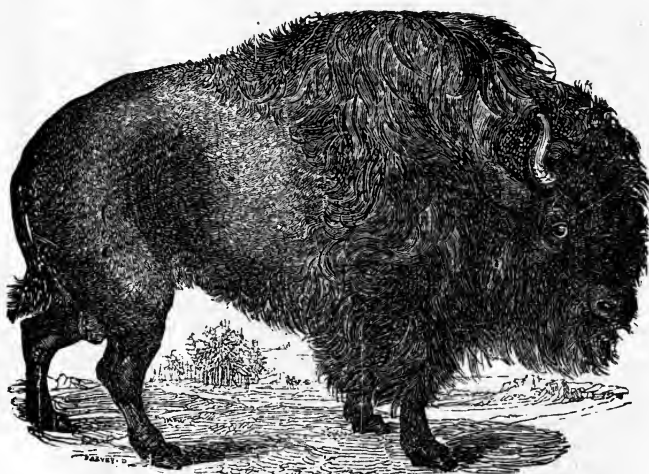
my good friend, Mr. E. seemed to level all his displeasure at the devil; for he was in hopes I should be enabled, through the gracious arm of the Lord, to cut Rahab in pieces; therefore he furnished me with a sword of the Spirit—a new Bible, with Morocco binding and silver clasps. I had got one old cart-horse, (says W. H.) that I had bought with the rest of the stock on the farm, and I wanted two more, but money ran short; and I determined also to have a large tilted cart, to take my family to chapel, and the man should drive it on the Sunday and on lecture nights, and I would ride my little horse. This was the most eligible plan that I could adopt; and on this I determined, as soon as God should send money to procure them. I came to this conclusion on a Friday; and on the next day, toward evening, came two or three friends from town to see me. I wondered not a little at their coming, as they knew that on a Saturday I never like to see any body, and therefore I conceived that they must be come with some heavy tidings; some friend was dead, or something bad had happened. But they came to inform me that some friends had agreed among themselves, and bought me a coach and a pair of horses, which they intended to make me a present of. I informed them that the assessed taxes ran so high, that I should not be able to keep it. But they stopped my mouth by informing me, that the money for paying the taxes for the coach and horses was subscribed also; so that nothing lay upon me, but the keep of the horses. Thus, instead of being at the expense of a tilted cart, God sent me a coach without cost, and two horses without my purchasing them; and which, with my other old horse, would do the work of the farm, as well as the work of the coach; and my bailiff informed me that he could drive it, having formerly drove one. Thus was I set up. But at this time the pocket was bare, and many things were wanting, both in the house and on the farm, and a place to fit up for my bailiff and dairy-woman to live in. And it was but a few days afterward before a gentleman out of the country called upon me; and, being up in my study with me, he said, ‘My friend, I often told you, you would keep your coach before you died; and I always promised, that whenever you had a coach, I would give you a pair of horses; and I will not be worse than my word. I have inquired of Father Green, and he tells me that the horses cost forty-five pounds, and there is the money.’ In a day or two after, the coach, horses, and harness, came; and, having now a little money, I wrote to a friend in the country to send me twelve ewes, and a male with them; and he sent me twelve excellent ones, and the male with them, but would not be paid for them; they were a present to the farm. ‘Whoso is wise and will observe these things, even they shall understand the loving-kindness of the Lord.’ Ps. cvii. 43.

Much did Mr. Huntingdon owe to the singularity of his ways. Singular in his outset and career, singular in his opinions, singular in his own appearance, singular in his chapel, singular in his style of preaching, he seemed to know, as well as most men, the value of singularity. He not only excelled in extempore eloquence, but his peculiarities distinguished him from most other preachers. Having formally announced his text, he laid his Bible at once aside, and never referred to it again. Having laid on one side the volume of inspiration, and disdaining the trammels of transcription, he proceeded directly to his object; and, excepting incidental digressions, as, "Take care of your pockets!" "Wake that snoring sinner!" "Silence that noisy numscull!" "Turn out that drunken dog!" excepting such occasional digressions, which, like the episodes of poetry, must, when skilfully introduced, be understood to heighten the effect of the whole, our orator never deviated from the course in which he commenced his eccentric career of ministerial labour.

He had other advantages over many of his pulpit compeers. Being of the metaphorical and allegorical school, as well as possessing his citations by rote, there is seldom to be found the passage, from the book of Genesis to the Revelation of St. John, that may not have, remotely or allusively, some connection with the subject immediately under his investigation. Hence the variety, as well as the fertility, of his eloquence. Hence the novelty of his commentaries; his truly astonishing talent of reconciling texts, else undoubtedly incongruous; and of discovering dissimilarities, and asserting difficulties, where none were believed to exist. Nothing could exceed the dictatorial dogmatism of this famous preacher. Believe him, none but him,—and that is enough. If he aimed thus to pin the faith of those who hear him, he would say over and over, "As sure as I am born, 'tis," &c. or, "I believe this," or, "I know this," "I am sure of it," or, "I believe the plain English of it (some difficult text) to be," &c. When he adds, as he was wont, by way of fixing his point, "Now, you can't help it," or, "So it is," or, "It must be so in spite of you," he did this with a most significant shake of his head, with a sort of beldam *hauteur*, with all the dignity of defiance. Action he seemed to have none, except that of shifting his handkerchief from hand to hand, and hugging his cushion as though it were his bolster. He therefore owed his distinction to the absence of those qualities by which most men rise. Self has done great things for him: self-taught, self-raised, all of self. "God (says Mr. H.) enabled me to put out several little books, which were almost universally exclaimed against, both by preachers and professors, and by these means God sent them into all winds; so that I soon rubbed off one hundred, and



MUSK OX.



AMERICAN BISON.



GAZELLE.



ANTELOPE.

soon after another, so that, in a short time, I had reduced my thousand pounds (debt) down to seven hundred."

Of his works, he adds, that "they are calculated (as he thinks,) to suit the earnest inquirer; the soul in bondage, in the furnace, in the path of tribulation, or in the strong hold of Satan; and (says he) I have heard of them from Wales, from Scotland, from Ireland, from various parts of America, from Cadiz in Spain, from Alexandria in Egypt, and, I believe, from both the East and West Indies."

His "Bank of Faith" has proved a bank of gold! When he wrote so much of what came to him as gifts, was it not to rouse more to give? The man who says he lives by gifts, will, as he gets his friends, find gifts by which he may live. He died at London, in 1813; and such was the avidity of his adherents to obtain a relic of him, that his furniture sold at ten times the original value. An old chair went off at forty pounds.

CHAP. XII.

CURIOSITIES RESPECTING ANIMALS.

Animal Generation—Formation of Animals—Preservation of Animals—Destruction of Animals—Animal Reproductions.

See, thro' this air, this ocean, and this earth,
All matter quick, and bursting into birth.
Above, how high progressive life may go!
Around, how wide! how deep extend below!
Vast chain of Being! which from God began,
Nature's ethereal, human, angel, man,
Beast, bird, fish, insect, what no eye can see,
No glass can reach; from Infinite to thee,
From thee to nothing.

Pope.

In entering upon the subject of Curiosities respecting Animals, we shall first introduce to the reader some interesting observations respecting the generation, formation, preservation, destruction, and reproduction, of animals in general; and, first, of animal generation.

Animal generation holds the first place among all that raise our admiration when we consider the Works of the Creator, and chiefly that appointment by which he has regulated the propagation, which is wisely adapted to the disposition and mode of life of every different species of animals, that people earth, air, or sea.

"Increase and multiply," said the benevolent Author of na-

ture, when he pronounced his blessing on the new made world. By virtue of this powerful mandate, all the various tribes of sentient beings have not only been preserved, but increased in an astonishing degree.

It is not in our province to describe the laws of gestation; we will content ourselves with a few brief hints upon this subject; and we shall find, that in different animals, nature operates in different ways, in order to produce the same general end.

The human female, and the female of quadrupeds, are possessed of a temperate cherishing warmth; this fits them for easy gestation, and enables them to afford proper nourishment to their young, till the time of birth.

Birds are intended to soar in the air, or to flit from place to place in search of food. Gestation, therefore, would be burdensome to them. For this reason, they lay eggs, covered with a hard shell: these, by natural instinct, they sit upon, and cherish till the young be excluded. The ostrich and the cassowary are said to be exempt from this law; as they commit their eggs to the sand, where the intense heat of the sun hatches them.

Fishes inhabit the waters, and most of them have cold blood, unfit for nourishing their young. The all-wise Creator, therefore, has ordained that most of them should lay their eggs near the shore; where, by means of the solar rays, the water is warmer, and also fitter for that purpose; and also because water insects abound more there, which afford nourishment to the young fry.

Salmon, when they are about to deposit their eggs, are led by instinct to ascend the stream, where purity and freshness are to be found in the waters: and to procure such a situation for its young, this fish will endure incredible toil and hazard.

The butterfly-fish is an exception to this general law, for that brings forth its young alive. The species of fish whose residence is in the middle of the ocean, are also exempt. Providence has given to these, eggs that swim; so that they are hatched among the sea-weeds, which also swim on the surface.

The various kinds of whales have warm blood, and therefore bring forth their young alive, and suckle them with their teats.

Some amphibious animals also bring forth their young alive, as the viper, &c. But such species as lay eggs, deposit them in places where the heat of the sun supplies the want of warmth in the parent. Thus the frog, and the lizard, drop their's in shallow waters, which soon receive a genial heat by the rays of the sun; the common snake, in dunghills, or other warm

places. The crocodile and sea-tortoise go ashore to lay their eggs in the sand; in these cases, Nature, as a provident nurse, takes care of all.

The multiplication of animals is not restrained to the same rule in all; for some have a remarkable power of increase, while others are, in this respect, confined within very narrow limits. Yet, in general, we find, that nature observes this order, that the least animals, and those which are most useful for food to others, usually increase with the greatest rapidity. The mite, and many other insects, will multiply to a thousand within the compass of a few days; while the elephant hardly produces a young one in two years.

Birds of the hawk-kind seldom lay more than two eggs; while poultry will produce from fifteen to thirty. The diver, or loon, which is eaten by few animals, lays also only two eggs; but the duck-kind, moor game, partridges, &c. and small birds in general, lay a great many. Most of the insect tribes neither bear young nor hatch eggs; yet they are the most numerous of all living creatures; and were their bulk proportionable to their numbers, there would not be room on the earth for any other animals. The Creator has wisely ordained the preservation of these minute creatures. The females lay not their eggs indiscriminately, but are endued with instinct to choose such places as may supply their infant offspring with proper nourishment: in their case, this is absolutely necessary, for the mother dies as soon as she has deposited her eggs, the male parent having died before this event takes place; so that no parental care ever falls to the lot of this orphan race. And indeed, were the parents to live, it does not appear that they would possess any power to assist their young. Butterflies, weevils, tree-bugs, gall-insects, and many others, lay their eggs on the leaves of plants; and every different tribe chooses its own species of plants. Nay, there is scarce any plant which does not afford nourishment to some insect; and still more, there is hardly any part of a plant which is not preferred by some of them. Thus one feeds upon the flower; another upon the leaves; another upon the trunk; and still another upon the root. But it is particularly curious to observe how the leaves of some trees of plants are formed into dwellings for the convenience of these creatures. Thus the gall-insect fixes her eggs in the leaves of an oak; the wounded leaf swells, and a knob arises like an apple, which includes, protects, and nourishes the embryo. In the same manner are the galls produced, which are brought from Asiatic Turkey, and which are used both as a medicine, and as a dye in several of our manufactories.

When the tree-bug has deposited its eggs, in the boughs of the fir-tree, excrescences arise, shaped like pearls. When

another insect of the same species has deposited its eggs in the mouse-ear, chick-weed, or speedwell plants, the leaves contract in a wonderful manner into the shape of a head. The water spider excludes eggs either on the extremities of juniper, which from thence forms a lodging that resembles the arrow-headed grass; or on the leaves of the poplar, from whence a red globe is produced. The tree-louse lays its eggs on the leaves of the black poplar, which turn into a kind of inflated bag; and so in many other instances.

Nor is it only upon plants that insects live and lay their eggs. The gnat commits her's to stagnant waters; the flesh-fly, in putrified flesh; another kind of insect deposits her's in the cracks of cheese.

Some insects exclude their eggs on certain animals; the mill-beetle, between the scales of fishes; a species of the gad-fly, on the back of bullocks; another of the same species, on the back of the rein-deer; another, in the noses of sheep; another still, in the intestinal tube, or the throat of horses. Nay, even insects themselves are generally surrounded with the eggs of other insects; so that there is, perhaps, no animal to be found, but what affords both lodging, and nourishment, and food, to other animals: even man himself, the haughty lord of this lower world, is not exempt from this general law.

We shall next call the reader's attention to some particulars respecting the **FORMATION OF ANIMALS**.

Whatever matter may be in itself as to its essence, it is certain that it appears to our senses as various and heterogeneous; however, the modus of the formation of animals is still unknown. The inspired writers express themselves here, at least, according to the capacity of the learned, as well as the vulgar, when they acknowledge the ignorance of mankind,—how the bones do at first grow in their embryo state,—and that we are fearfully and wonderfully made, when we are fashioned secretly in the lower parts of the earth. However, it seems not probable, that one part of matter acting upon another, should produce animal existence, though we grant it may have a strange and unaccountable power in the alteration of matter purely insensible or inanimate. Fermentation may dilate, and extremely alter the parts of animated matter, when they are delineated and marked out by the finger of the Almighty; but still, matter being a principle purely passive and irrational, we cannot conceive how it should become an animal, any more than a world, it being much more easy for stones to leap out of a quarry, and make an Escurial, without asking the architect's leave, or calling for the mason, with his mortar and trowel, to assist them.

Nor seems it necessary, or rational, that the first seed of every creature should formally include all those seeds that should be afterwards produced from it; since it is, we think, sufficient that it should potentially include them, just as Abraham did Levi; or as one kernel does all those indeterminate kernels that may be thence afterwards raised; the first seeds being doubtless of the same nature with those that now exist, after so many thousand years, the order of time making only an accidental difference; which if we do not grant, we must run into this absurdity, that every thing does not produce its like,—a bird a bird, or a horse a horse,—which would be to fill all the world with monsters, which nature does so much abhor.

But every vegetable seed, or kernel, for example, does now actually and formally contain all the seeds or kernels which may be at any time afterwards produced from them. A kernel has indeed, as we have found by microscopes, a pretty fair and distinct delineation of the tree and branches into which it may be afterwards formed by the fermentation of its parts, and addition of suitable matter; as in the tree are potentially contained all the thousands and millions of kernels, and so of trees, that shall or may be thence raised afterwards: and some are apt to believe it must be similar in the first animals; whereas the finest glasses, which are brought to an almost incredible perfection, cannot discover actual seeds in seeds, or kernels in kernels; though, if there were any such thing as an actual least atom, they might, one would think, be discovered by them, since they have shewn us not only seeds, but even new animals, in many parts of matter where we never suspected them, and even in some of the smallest animals themselves, whereof our naked sight can take no cognizance. As for the parts of matter, be they how they will, finite or infinite, it makes no great alteration; for, if these parts are not all seminal, we are no nearer. Nay, at best, an absurdity seems to be the consequence of this hypothesis; because, if those parts are infinite, and include all successive generations of animals, it would follow that the number of animals too should be infinite; and, instead of one, we should have a thousand infinites; and it would be strange too if they should not, some of them, be greater or less than one another.

For that pleasant fancy, that all the seeds of animals were distinctly created at the beginning of time and things, that they are mingled with all the elements, that we take them in with our food, and the *he* and *she* atoms either fly off or stay, as they like their lodgings; we hope there is no need of being serious to confute it. And we may ask of this, as well as the former hypothesis,—what need of them, when the work may be done without them? The kernel, as before, contains tho

tree, the tree a thousand other fruits, and ten thousand kernels; the first animal several others; and as many of them as Nature can dispose of, and provide fit nourishment for, are produced into what we may call actual being, in comparison to what they before enjoyed. If it be asked, whether these imperfect creatures have all distinct souls while lurking yet in their parent? we answer, that there is no need of it; they are not yet so much as well-defined bodies, but rather parts of the parent: there is required yet a great deal more of the chemistry and mechanism of nature, and that in both sexes, to make one or more of these embryo beings, the offspring of man, capable of receiving a rational soul; but when that capacity comes, and wherein it consists, perhaps he only knows, who is the Father of spirits, as well as the former of the universe.

ON THE PRESERVATION OF ANIMALS.—With respect to the preservation of animals, it may be observed, that in tender age, while the young are unable to provide for themselves, the parent possesses the most anxious care for them. The lioness, the tigress, and every other savage of the wilderness, are gentle and tender towards their offspring; they spare no pains, no labour, for their helpless progeny; they scour the forest with indescribable rage; destruction marks their path; they bear their victim to the covert, and teach their whelps to quaff the blood of the slain. There is one great law, which the all-wise Creator has implanted in animals towards their offspring, which is, that, according to their nature, they should provide for their nourishment, defence, and comfort.

All quadrupeds give suck to their young, and support them by a liquor of a most delicate taste, and perfectly easy of digestion, till they are capable of receiving nourishment from more solid food.

Birds build their nests in the most artificial manner, and line them as soft as possible, that the eggs or young may not be injured. Nor do they build promiscuously, but chuse such places as are most concealed, and likely to be free from the attacks of their enemies: thus the hanging-bird of the tropical countries, makes its nest of the fibres of withered plants lined with down, and fixes it at the extremity of some bough hanging over the water, that it may be out of reach; and the diver places its swimming nest upon the water itself, among the rushes.

The male rooks and crows, during the time of incubation, bring food to the females. Pigeons, and most of the small birds which pair, sit by turns; but where polygamy prevails, the males scarcely take any care of the young.

Birds of the duck kind pluck the feathers off their breast.

and cover their eggs with them, lest they should be injured by cold when they quit their nest for food ; and when the young are hatched, they shew the utmost solicitude in providing for them, till they are able to fly, and shift for themselves.

Young pigeons are fed with hard seeds, which the parents first have prepared in their own crops, that so the infant bird may digest them easily. And the eagle makes its nest on the highest precipices of mountains, and in the warmest spot, facing the sun ; here the prey which it brings is corrupted by the heat, and made digestible to the young.

There is, indeed, an exception to this fostering care of animals in the cuckoo, which lays its eggs in the nest of some small bird, generally the wagtail, yellow-hammer, or white throat, and leaves both the incubation and preservation of the young to them. But naturalists inform us that this apparent want of instinct in the cuckoo proceeds from the structure and situation of its stomach, which disqualifies it for incubation ; still its care is conspicuous in providing a proper, though a foreign situation, for its eggs.

Amphibious animals, fishes, and insects, which cannot come under the care of their parents, yet owe this to them, that they are deposited in places where they easily find proper nourishment.

When animals come to that maturity as no longer to want parental care, they exercise the utmost labour and industry for the preservation of their own lives. But the different species are many, and the individuals of each species are very numerous. In order, therefore, that all may be supported, the Creator has assigned to each class its proper food, and set bounds and limits to their appetites. Some live on particular species of plants, which are produced only in particular animalcula ; others on carcases, and some even on mud and dung. For this reason, Providence has ordained that some should swim in certain regions of the watery element ; that others should fly ; and that some should inhabit the torrid, the frigid, or the temperate zones. Different animals also are confined to certain spots in the same zone : some frequent the deserts, others the meadows, or the cultivated grounds ; thus the mountains, the woods, the pools, the gardens, have their proper inhabitants. By this means there is no terrestrial tract, no sea, no river, no country, but what teems with life. Hence one species of animals does not injuriously invade the aliment of another ; and hence the world at all times affords support to so many, and such various inhabitants, and nothing which it produces is in vain.

We ought to remark, also, the wisdom and goodness of Providence in forming the structure of the bodies of animals for their peculiar manner of life, and in giving them clothing

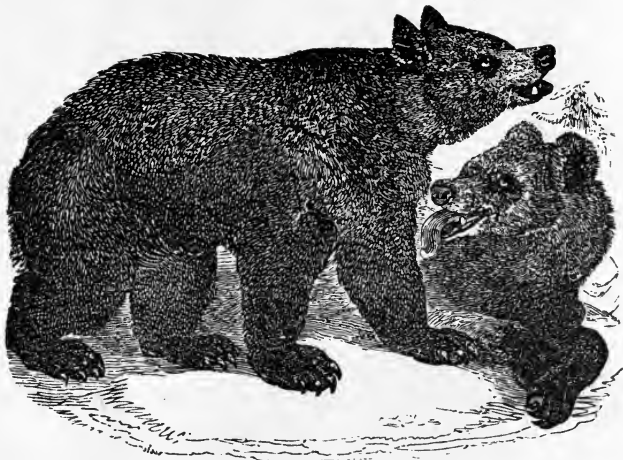
which is suitable both to the country and element in which they live.

Thus the elephant, the rhinoceros, and the various kinds of monkeys, are destined to live in the torrid regions, where the sun darts its fiercest rays; their skins are therefore naked, for were they covered with hair, they would perish with heat. They are also of such conformation of body as to suit their different manner of life. The rein-deer has his habitation in the coldest parts of Lapland; his food is the liverwort, which grows nowhere else so abundantly; and as the cold is in that country intense, this useful animal is covered with hair of the densest kind; by this means he easily defies the keenness of the arctic regions. The rough-legged partridge passes its life in the Lapland Alps, where it feeds on the seeds of the dwarf birch: while, to withstand the cold, and to enable it to run freely among the snow, even its feet are thickly beset with feathers.

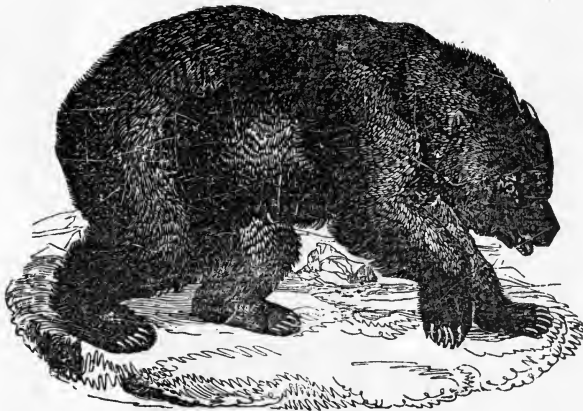
The camel is a native of the arid sandy deserts, which, with their dreadful sterility, are yet capable of yielding him support. How wisely has the Creator formed him! his foot is made to traverse the burning sands; and as the place of his habitation affords but little water, he is made capable of enduring long journeys, and going many days without quenching his thirst; for he is furnished with a natural reservoir, in which, when he drinks, he stores up a quantity of water, and has the power of using it in a frugal and sparing manner, when, for his food, he crops the dry thistle of the desert. The bullock delights in low rich grounds, because there he finds the food which is most palatable to him. The wild horse chiefly resorts to woods, and feeds upon leafy plants. Sheep prefer hills of moderate elevation, where they find a short sweet grass, of which they are very fond. Goats climb up the precipices of mountains, that they may browse on the tender shrubs; and, in order to fit them for their situation, their feet are made for jumping.

Swine chiefly get provision by turning up the earth; for which purpose their snouts are peculiarly formed. In this employment they find succulent roots, insects, and reptiles.

So various is the appetite of animals, that there is scarcely any plant which is not chosen by some, and left untouched by others. Thus the horse refuses the water hemlock, which the goat will eat: the goat will not feed on monkshood, but the horse eats it with avidity. The long-leaved water hemlock is avoided by the bullock; yet the sheep is fond of it. The spurge is poisonous to man; but the caterpillar finds it a wholesome nourishment. Some animals live on the leaves of certain plants, others on the stalks, and others still on the rind, or even the roots of the same vegetable



BROWN BEAR.



GRIZZLY BEAR.



FOSSILS — IGUANODON.

It should seem from hence, that no plant is absolutely poisonous, but only relatively so: that is, there is no plant but what is wholesome food to some animal or other. Thus divine wisdom has assigned an use for all its productions.

The care of Providence is further evident in giving to each animal an instinctive knowledge of its proper aliment; but that delicacy of taste and smell, by which they accurately distinguish the wholesome from the pernicious, is not so evident in domestic animals as in those which are in a state of nature.

All birds of the goose kind pass great part of their lives in water, feeding on water-insects, fishes, and their eggs. It is evident that they are calculated for this mode of existence; their beaks, their necks, their feet, and their feathers, are formed for it. All other birds are as aptly fitted for their manner of life as these.

The sea-swallow is said to get his food in a very singular way. Fish are his support, but he is not capable of diving in order to catch them like other aquatic birds; the sea-gull, therefore, is his caterer: when this last has gorged himself, he is pursued by the former, who buffets him till he casts up a part of his prey, which the other catches before it reaches the water; but in those seasons when the fishes hide themselves in deep water, the merganser supplies even the gull himself with food, being capable of plunging deeper into the sea.

Small birds are generally supposed to live principally upon the berries of ivy and hawthorn; but modern naturalists contradict this, and affirm that their winter food is the knot-grass, which bears heavy seeds, like those of the black bind-weed. This is a very common plant, not easily destroyed; it grows in great abundance by the sides of roads, and trampling on it will not kill it; it is extremely plentiful in corn-fields after harvest, and gives a reddish hue to them by the multitude of its seeds. Wherever the husbandman ploughs, this plant will grow, nor can all his art prevent it: thus a part of his labours are necessarily destined for the propagation of a plant which our heavenly Father has designed immediately for the support of the "fowls of the air;" for though "they sow not, neither gather into barns," yet are they fed by him.

Some birds who live on insects, migrate every year to foreign regions, in order to seek food in a milder climate; while all the northern countries, where they live well in summer, are covered with snow. Some naturalists reckon the different species of the *Hirundo*, or swallow, among the birds of passage; while others affirm that they do not migrate, but, at the approach of winter, seek an asylum from the cold in the clefts of rocks, with which our island is surrounded, or take refuge

in the bottom of pools and lakes, among the reeds and rushes; others still, who have made their observations with more attention and patience than either of the former, allow that the old swallows with their early brood do migrate; but that the latter hatches, which are incapable of distant flight, lay themselves up, and become torpid during the winter; and at the approach of spring, by the wonderful appointment of Nature, they come forth again with renewed life and activity. In these, and all other animals which become torpid in the winter, the peristaltic motion of the bowels ceases while they are dormant, so that they do not suffer by hunger. Dr. Lister remarks, concerning this class of animals, that their blood, when poured into a vessel, does not coagulate, like that of all other animals; and therefore is no less fit for circulation when they revive, than before.

The birds called moor-fowl, during great snows, work out paths for themselves under its surface, where they live in safety, and get their food. They moult in summer, so that about the latter end of August they cannot fly, and are therefore obliged to run in the woods; but then the blackberries and bilberries are ripe, from whence they are abundantly supplied with food: but the young do not moult the first year, and therefore, though they cannot run so well, are enabled to escape danger by flight.

The migration of birds is not only a fact, but, as it relates to many kinds of them, is an useful fact to mankind. This remark applies to such of them as feed on insects, the number of which is so great, that if these birds did not destroy them it would be almost impossible for us to live.

Of the various kinds of water-fowl that are known in Europe, there is hardly any but what, in the spring, are found to repair to Lapland. This is a country of lakes, rivers, swamps, and mountains, covered with thick and gloomy forests, that afford shelter during summer to these birds.

In these arctic regions, by reason of the thickness of the woods, the ground remains moist and penetrable, and the waters contain the larvæ of the gnat in innumerable quantities. The days there are long, and the beautiful and splendid meteors of the night indulge them with every opportunity of collecting so minute a food; at the same time, men are very sparingly scattered over that vast northern waste. Yet, Linnæus, that great explorer of nature, in his excursion to Lapland, was astonished at the myriads of water-fowl that migrated with him out of that country, which exceeded in multitude the army of Xerxes, covering, for eight whole days and nights, the surface of the river Calix! The surprise of Linnæus was occasioned by his supposing their support to be furnished chiefly by the vegetable kingdom, almost denied

to the Lapland waters ; not knowing that the all-bountiful Creator had plenteously provided insect food for them in that dreary wilderness.

Certain beasts, also, as well as birds, become torpid, or at least inactive, when they are, by the rigour of the season, excluded from the necessaries of life. Thus the bear, at the end of autumn, collects a quantity of moss, into which he creeps, and there lies all the winter, subsisting upon no other nourishment than his fat, collected during the summer in the cellulous membrane, and which, without doubt, during his fast, circulates through his vessels, and supplies the place of food.

The hedge-hog, badger, and some kinds of mice, fill their winter quarters with vegetables, which they eat during mild weather in the winter, and sleep during the frosts. The bat seems cold and quite dead, but revives in the spring : while most of the amphibious animals get into dens, or the bottom of lakes and pools.

Among other instances of the preservation of animals, we ought to mention that of the pole-cat of America, commonly called the squash or skink. This is a small animal of the weasel kind, which some of the planters of that country keep about their premises to perform the office of a cat. This creature has always a very strong and disagreeable smell, but when affrighted or enraged, it emits so horrible a stench, as to prevent any other creature from approaching it : even dogs in pursuit of it, when they find this extraordinary mode of defence made use of, will instantly turn, and leave him undisputed master of the field ; nor can any attempts ever bring them to rally again. Kalm, as quoted by Buffon, says, " One of these animals came near the farm where I lived in the year 1749. It was in the winter season, during the night ; and the dogs that were upon the watch, pursued it for some time, until it discharged against them. Although I was in bed a good way off, I thought I should have been suffocated ; and the cows and oxen themselves, by their lowings, shewed how much they were affected by the stench."

Nor is even the serpent, in its various kinds, destitute of the care of the common Father of nature. This reptile, which has neither wings to fly, nor the power to run with much speed, would not have the means to take its prey, were it not endowed with superior cunning to most other creatures. In favour of the serpent, also, there is a terror attending its appearance, which operates with such power upon birds and other small animals, as often to cause them to fall an easy prey to it. Hence, probably, has arisen the fiction of the power of fascination, which has been confidently ascribed to the rattlesnake and some other serpents.

On the DESTRUCTION OF ANIMALS.

In considering the destruction of animals, we may observe that Nature is continually operating: she produces, preserves for a time, and then destroys all her productions. Man himself is subject to this general order; for he also, like other creatures, returns to the dust from whence he was taken.

This process of nature is marked even in the vicissitudes of the seasons. Spring, like the jovial, playful infancy of all living creatures, represents childhood and youth; for then plants spread forth their flowers, fishes play in the waters, birds sing, and universal nature rejoices. Summer, like middle age, exhibits plants and trees full clothed in green; fruits ripen; and every thing is full of life. But autumn is comparatively gloomy; for then the leaves fall from the trees, and plants begin to wither, insects grow torpid, and many animals retire to their winter quarters.

The day proceeds with steps similar to the year. In the morning every thing is fresh and playful; at noon all is energy and action; evening follows, and every thing is inert and sluggish.

Thus the age of man begins from the cradle; pleasing childhood succeeds; then sprightly youth; afterwards manhood, firm, severe, and intent on self-preservation; lastly, old age creeps on, debilitates, and, at length, totally destroys our tottering bodies.

But we must consider the destruction of animals more at large. We have before observed, that all animals do not live on vegetables, but there are some which feed on animalcula; others on insects. Nay, some there are which subsist only by rapine, and daily destroy some or other of the peaceable kind.

The destruction of animals by each other, is generally in progression,—the strong prevailing against the weak. Thus, the tree-louse lives on plants; the fly called *musca amphidivora*, lives on the tree-louse; the hornet and wasp-fly, on the *musca amphidivora*; the dragon-fly, on the hornet and wasp-fly; the larger spider, on the dragon-fly; small birds feed on the spider; and lastly, the hawk kind on the small birds.

In like manner, the *monoculus* delights in putrid waters; the gnat eats the *monoculus*; the frog eats the gnat; the pike eats the frog; and the sea-calf eats the pike.

The bat and the goat-sucker make their excursions only at night, that they may catch the moths, which at that time fly about in great quantities.

The woodpecker pulls out the insects which lie hid in the trunks of trees. The swallow pursues those which fly about in the open air. The mole feeds on worms and grubs in the earth. The large fishes devour the small ones. And perhaps

there is not an animal in existence, which has not an enemy to contend with.

Among quadrupeds, wild beasts are most remarkably pernicious and dangerous to others. But that they may not, by their cruelty, destroy a whole species, these are circumscribed within certain bounds: as to the fiercest of them, they are few in number, when compared with other animals; sometimes they fall upon and destroy each other; and it is remarkable also, that they seldom live to a great age, for they are subject, from the nature of their diet, to various diseases, which bring them sooner to an end than those animals which live on vegetables. It has been asked, why has the Supreme Being constituted such an order in nature, that, it should seem, some animals are created only to be destroyed by others? To this it has been answered, that Providence not only aimed at sustaining, but also keeping a just proportion amongst all the species, and so preventing any one of them from increasing too much, to the detriment of men and other animals. For if it be true, as it assuredly is, that the surface of the earth can support only a certain number of creatures, they must all perish, if the same number were doubled or trebled.

There are many kinds of flies, which bring forth so abundantly, that they would soon fill the air, and, like clouds, intercept the light of the sun, unless they were devoured by birds, spiders, and other animals.

Storks and cranes free Egypt from frogs, which, after the inundation of the Nile, cover the whole country. Falcons clear Palestine from mice. Bellonius, on this subject, says, "The storks come to Egypt in such abundance, that the fields and meadows are quite white with them. Yet the Egyptians are not displeased with them, as frogs are generated in such numbers, that, did not the storks devour them, they would over-run every thing. Besides, they also catch and eat serpents. Between Belba and Gaza, the fields of Palestine are often injured by mice and rats; and were these vermin not destroyed by the falcons, that come here by instinct, the inhabitants could have no harvest."

The white fox is of equal advantage in the Lapland Alps; as he destroys the Norway rat, which, by its prodigious increase, would otherwise entirely destroy vegetation in that country.

It is sufficient for us to believe that Providence is wise in all its works, and that nothing is made in vain. When rapacious animals do us mischief, let us not think that the Creator planned the order of nature according to our private principles of economy; for the Laplander has one way of living, the European husbandman another, and the Hottentot differs from them both; whereas the stupendous Deity is one throughout

the globe; and if Providence do not always calculate according to our method of reckoning, we ought to consider this affair in the same light as when different seamen wait for a fair wind. every one with respect to the port to which he is bound: these we plainly see cannot all be satisfied.

We shall conclude this branch, by turning once more to Man, and tracing him through his progressive stages of decay, until death puts a final period to his earthly existence.

The human form has no sooner arrived at its state of perfection, than it begins to decline. The alteration is at first insensible, and often several years are elapsed before we find ourselves grown old. The news of this unwelcome change too generally comes from without; and we learn from others that we grow old, before we are willing to believe the report.

When the body is come to its full height, and is extended into its just dimensions, it then also begins to receive an additional bulk, which rather loads than assists it. This is formed of fat, which, generally, at about the age of forty, covers all the muscles, and interrupts their activity. Every exertion is then performed with greater labour, and the increase of size only serves as the forerunner of decay.

The bones also become every day more solid. In the embryo they are almost as soft as the muscles and the flesh, but by degrees they harden, and acquire their proper vigour; but still, for the purpose of circulation, they are furnished through all their substance with their proper canals. Nevertheless, these canals are of very different capacities during the different stages of life. In infancy they are capacious, and the blood flows almost as freely through the bones as through any other part of the body; in manhood their size is greatly diminished, the vessels are almost imperceptible, and the circulation is proportionably slow. But in the decline of life, the blood which flows through the bones, no longer contributing to their growth, must necessarily serve to increase their hardness. The channels which run through the human frame may be compared to those pipes that we see crusted on the inside, by the water, for a long continuance, running through them. Both every day grow less and less, by the small rigid particles which are deposited within them. Thus, as the vessels are by degrees diminished, the juices also, which circulate through them, are diminished in proportion; till at length, in old age, these props of the human frame are not only more solid, but more brittle.

The cartilages, likewise, grow more rigid; the juices circulating through them, every day contribute to make them harder, so that those parts which in youth are elastic and pliant, in age become hard and bony, consequently the motion of the joints must become more difficult. Thus, in old age,

every action of the body is performed with labour, and the cartilages, formerly so supple, will now sooner break than bend.

As the cartilages acquire hardness, and unfit the joints for motion, so also that mucous liquor, which is always secreted between the joints, and which serves, like oil to a hinge, to give them an easy and ready play, is now grown more scanty. It becomes thicker and more clammy, more unfit for answering the purposes of motion, and from thence, in old age every joint is stiff and awkward. At every motion this clammy liquor is heard to crack; and it is not without a great effort of the muscles, that its resistance is overcome. Old persons have been known, that seldom moved a single joint without thus giving notice of the violence that was done to it.

The membranes that cover the bones, joints, and the rest of the body, become, as we grow old, more dense and more dry. Those which surround the bones soon cease to be ductile. The fibres, of which the muscles or flesh is composed, become every day more rigid; and while, to the touch, the body seems, as we advance in years, to grow softer, it is in reality increasing in hardness. It is the skin, and not the flesh, that we feel on such occasions. The fat, and the flabbiness of it, seem to give an appearance of softness, which the flesh itself is very far from having. None can doubt this after trying the difference between the flesh of young and old animals. The first is soft and tender, the last is hard and dry.

The skin is the only part of the body that age does not harden; that stretches to every degree of tension; and we have often frightful instances of its pliancy, in many disorders which are incident to humanity. In youth, while the body is vigorous and increasing, it continues to give way to its growth. But although it thus adapts itself to our increase, its does not in the same manner conform to our decay. The skin, in youth and health, is plump, glossy, veined, and clear; but when the body begins to decline, it has not elasticity enough to shrink entirely with its diminution; it becomes dark or yellow, and hangs in wrinkles, which no cosmetic can remove. The wrinkles of the body, in general proceed from this cause; but those of the face seem to proceed from another, namely, from that variety of positions into which it is put by the speech, the food, or the passions. Every grimace, every passion, and every gratification of appetite, puts the visage into different forms. These are visible enough in young persons; but what at first was accidental or transitory, becomes, by habit, unalterably fixed in the visage as it grows older.

Hence, as we advance in age, the bones, the cartilages, the membranes, the flesh, and every fibre of the body, becomes more soid, more dry, and more brittle. Every part shrinks.

motion becomes more slow, the circulation of the fluids is performed with less freedom; perspiration diminishes; the secretions alter, the digestion becomes laborious; and the juices no longer serve to convey their accustomed nourishment. Thus the body dies by little and little, and all its functions are diminished by degrees; life is driven from one part of the frame to another; universal rigidity prevails; and death, at last, seizes upon the remnant that is left.

As the bones, the cartilages, the muscles, and all other parts of the body, are softer in women than in men, these parts must, of consequence, require a longer time to arrive at that state of hardness which occasions death. Women, therefore, ought to be longer in growing old than men, and this is, generally speaking, the case. If we consult the tables which have been drawn up respecting human life, we shall find that, after a certain age, they are more long-lived than men, all other circumstances the same. Thus a woman of sixty has a greater probability, than a man of the same age, of living till eighty.

We shall close this chapter with an account of ANIMAL REPRODUCTIONS.

Here we discover a new field of wonders, that seems entirely to contradict the principles that we had adopted concerning the formation of organized bodies. It was long thought that animals could only be multiplied by eggs, or by young ones. But it is now found that there are some exceptions to this general rule, since certain animal bodies have been discovered, that may be divided into as many complete bodies as you please; for each part thus separated from the parent body, soon repairs what is deficient, and becomes a complete animal. It is now no longer doubtful that the polypus belongs to the class of animals, though it much resembles plants, both in form, and in its mode of propagating. The bodies of these creatures may be either cut across or longitudinally, and the pieces will become so many complete polypi. Even from the skin, or least part, cut off from the body, one or more polypi will be produced; and if several pieces cut off be joined together by the extremities, they will perfectly unite, nourish each other, and become one body. This discovery has given rise to other experiments, and it has been found that polypi are not the only animals which live and grow after being cut in pieces. The earth-worm will multiply after being cut in two; to the tail there grows a head, and the two pieces then become two worms. After having been divided, they cannot be joined together again; they remain for some time in the same state, or grow rather smaller; we then see at the extremity which was cut, a little white button begin to appear, which increases

and gradually lengthens. Soon after, we may observe rings at first very close together, but insensibly extending on all sides; a new stomach, and other organs, are then formed. We may at any time make the following experiment with snails: cut off their heads close by the horns, and in a certain space of time the head will be reproduced. A similar circumstance takes place in crabs; if one of their claws is torn off, it will again be entirely reproduced.

A very remarkable experiment was made by Duhamel, on the thigh of a chicken. After the thigh-bone which had been broken was perfectly restored, and a callus completely formed, he stripped off the flesh down to the bone;—the parts were gradually reproduced, and the bone, and the circulation of the blood, again renewed. We know then that some animals may be multiplied by dividing them into pieces; and we no longer doubt that the young of certain insects may be produced in the same manner as a branch is from a tree; that, being cut in pieces, they will live again in the smallest piece; that they may be turned inside out like a glove, divided into pieces, then turned again, and yet live, eat, grow, and multiply. Here a question offers itself, which perhaps no naturalist can resolve in a satisfactory manner: How does it happen that the parts thus cut off, can be again reproduced? We must suppose that germs are distributed to every part of the body; whilst in other animals they are only contained in certain parts. These germs unfold themselves when they receive proper nourishment. Thus, when an animal is cut in pieces, the germ is supplied with the necessary juices, which would have been conveyed to other parts, if they had not been diverted into a different channel. The superfluous juices develop those parts which without them would have continued attached to each other. Every part of the polypus and worm, contains in itself, as the bud does the rudiments of a tree, all the viscera necessary to the animal. The parts essential to life are distributed throughout the body, and the circulation is carried on even in the smallest particles. As we do not understand all the means that the Author of nature makes use of to distribute life and feeling to such a number of animals, we have no reason to maintain, that the creatures of which we have been speaking, are the only ones that are exceptions to the general rule, in their mode of propagating. The fecundity of nature, and the infinite wisdom of the Creator, always surpass our feeble conceptions. The same hand that has formed the polypus and the worm, has shewn us that it is able to simplify the structure of animals

CHAP. XIII.

CURIOSITIES RESPECTING ANIMALS.—(Continued.)

The Beaver, and its Habitations—The Mole—The Frog—The Toad—The Rhinoceros—Crocodiles and Alligators—Fossil Crocodile—The Ornithorhynchus Paradoxus—The Marmot, or Mountain Rat, of Switzerland.

Nature's unnumber'd family combine
In one beneficent, one vast design;
E'en from inanimates to breathing man,—
A heaven-conceiv'd, heaven-executed plan;
Onward, from those who soar or lowly creep,
The wholesome equipoise through all to keep,
As faithful agents in earth, sea, and air,
The lower world to watch with constant care;
Her due proportion wisely to conserve:—
A wondrous trust, from which they never swerve. *Pratt*

It would not be consistent with the plan of this work to embrace the whole natural history of the animal and vegetable kingdom. This is a Book of Curiosities; and it is our intention to present the reader with a sketch of the most remarkable things in the universe: our present subject, therefore, being curiosities respecting animals, we shall commence with—

THE BEAVER.—This animal was known to the ancients for its possession of that sebaceous matter called castor, secreted by two large glands near its genitals and anus, and of which each animal has about two ounces; but they appear to have been unacquainted with its habits and economy, with that mental contrivance and practical dexterity, which in its natural state so strikingly distinguish it. Beavers are found in the most northern latitudes of Europe and Asia, but are most abundant in North America.

In the months of June and July, they assemble in large companies to the number of two hundred, on the banks of some water, and proceed to the formation of their establishment. If the water be subject to risings and fallings, they erect a dam, to preserve it at a constant level; where this level is naturally preserved, this labour is superseded. The length of this dam is occasionally eight feet. In the preparation of it, they begin with felling some very high, but not extremely thick tree, on the border of a river, which can be made to fall into the water; and, in a short time, this is effected by the united operation of many, with their fore-teeth, the branches being afterwards cleared by the same process. A multitude of smaller trees are found necessary to complete

the fabric, and many of these are dragged from some distance by land, and formed into stakes; the fixing of which is a work of extreme difficulty and perseverance, some of the beavers with their teeth raising their large ends against the cross-beam, while others at the bottom dig with their fore-feet the holes in which the points are to be sunk. A series of these stakes, in several rows, is established from one bank of the river to the other, in connection with the cross-tree, and the intervals between them are filled up by vast quantities of earth, brought from a distance, and plashed with materials adapted to give it tenacity, and prevent its being carried off. The bark is formed at the bottom, of about the width of twelve feet, diminishing as it approaches the surface of the water, to two or three; being thus judiciously constructed to resist its weight and efforts by the inclined plane instead of perpendicular opposition.

These preparations, of such immense magnitude and toil, being completed, they proceed to the construction of their mansions, which are raised on piles near the margin of the stream or lake, and have one opening from the land, and another by which they have instant access to the water. These buildings are usually of an orbicular form, in general about the diameter of ten feet, and comprehending frequently several stories. The foundation walls are nearly two feet in thickness, resting upon planks or stakes, which constitute also their floors. In the houses of one story only, the walls, which in all cases are plastered with extreme neatness both externally and within, after rising about two feet perpendicularly, approach each other, so as at length to constitute, in closing, a species of dome. In the application of the mortar to their habitations, the tails as well as feet of the beavers are of essential service. Stone, wood, and a sandy kind of earth, are employed in their structures, which, by their compactness and strength, completely preclude injury from winds and rain. The alder, poplar, and willow, are the principal trees which they employ; and they always begin their operations on the trunk, at nearly two feet above the ground; nor do they ever desist from the process till its fall is completed. They sit instead of stand, at this labour, and while reducing the tree to the ground, derive a pleasure at once from the success of their toils, and from the gratification of their palate; and appetite by the bark, which is a favourite species of food to them, as well as the young and tender parts of the wood itself.

For their support in winter, ample stores are laid up near each separate cabin; and occasionally, to give variety and luxury to their repasts during a long season, in which their stores must have become dry and nearly tasteless, they will

make excursions into the neighbouring woods for fresh supplies. Depredations by the tenants of one cabin on the magazines of another are unknown, and the strictest notions of property and honesty are universal. Some of their habitations will contain six only, others twelve, and some even twenty or thirty inhabitants; and the whole village or township contains in general about twelve or fourteen habitations. Strangers are not permitted to intrude on the vicinity; but, amidst the different members of the society itself, there appears to prevail that attachment and that friendship which are the natural result of mutual co-operation, and of active and successful struggles against difficulty. The approach of danger is announced by the violent striking of their tails against the surface of the water, which extends the alarm to a great distance; and, while some throw themselves for security into the water, others retire within the precincts of their cabins, where they are safe from every enemy but man.

The neatness as well as the security of their dwellings is remarkable, the floors being strewed over with box and fir, and displaying the most admirable cleanness and order. Their general position is that of sitting, the upper part of the body, with the head, being considerably raised, while the lower touches, and is somewhat indeed immersed in, the water. This element is not only indispensable to them in the same way as to other quadrupeds, but they carefully preserve access to it even when the ice is of very considerable depth, for the purpose of regaling themselves by excursions to a great extent under the frozen surface. The most general method of taking them is by attacking their cabins during these rambles, and watching their approach to a hole dug in the ice at a small distance, to which they are obliged, after a certain time, to resort for respiration.

If a man, who had never been informed of the industry of beavers and their manner of building, were shewn the edifices that they construct, he would suppose them to be the work of most eminent architects. Every thing is wonderful in the labours of these amphibious animals; the regular plan, the size, the solidity, and the admirable art of these buildings, must fill every attentive observer with astonishment.

The works of beavers have a great resemblance to those of men; and upon their first appearance we may imagine them to be produced by rational and thinking beings; but when we examine them nearer, we shall find that in all their proceedings, these animals do not act upon the principles of reason, but by an instinct which is implanted in them by nature. If reason guided their labours, we should naturally conclude that the buildings which they now construct would be very different from those they formerly made, and that they would gra-

dually advance towards perfection. But we find that they never vary in the least from the rules of their forefathers, never deviate from the circle prescribed to them by nature, and the beavers of to-day build exactly after the same plan as those which lived before the deluge. But they are not the less worthy of our admiration. In these sagacious creatures we have an example of the great diversity there is in the instinct of animals—how superior is the instinct of the beaver to that of the sheep!

The flesh of the anterior part of the bodies of beavers resembles that of land animals in substance and flavour; while that of the lower possesses the taste, and smell, and lightness of fish.

The sexual union among these animals is connected with considerable individual choice, sentiment, and constancy.—Every couple pass together the autumn and winter, with the most perfect comfort and affection. About the close of winter, the females, after a gestation of four months, produce, in general, each two or three young, and soon after this period they are quitted by the males, who ramble into the country to enjoy the return of spring; occasionally returning to their cabins, but no longer dwelling in them. When the females have reared their young, which happens in the course of a few weeks, to a state in which they can follow their dams, these also quit their winter residence, and resort to the woods, to enjoy the opening bloom and renovated supplies of nature. If their habitations on the water should be impaired by floods, or winds, or enemies, the beavers assemble with great rapidity to repair the damage. If no alarm of this nature occurs, the summer is principally spent by them in the woods, and on the advance of autumn they assemble in the scene of their former labours and friendships, and prepare with assiduity for the confinement and rigours of approaching winter.

When taken young, the beaver may be tamed without difficulty; but it exhibits few or no indications of superior intelligence. Some beavers are averse to that association which so strikingly characterizes these animals in general, and satisfy themselves with digging holes in the banks of rivers, instead of erecting elaborate habitations. The fur of these is comparatively of little value.

Another subject of animal curiosity is, **THE MOLE.**—This animal is about six inches in length, without the tail. Its body is large and cylindrical, and its snout strong and cartilaginous. Its skin is of extraordinary thickness, and covered with a fur, short, but yielding to that of no other animal in fineness. It hears with particular acuteness, and, notwithstanding the popular opinion to the contrary, possesses eyes,

which it is stated to be able to withdraw or project at pleasure. It lives partly on the roots of vegetables, but principally on animal food, such as worms and insects, and is extremely voracious and fierce. Shaw relates, from Sir Thomas Brown, that a mole, a toad, and a serpent, have been repeatedly inclosed in a large glass vase, and that the mole has not only killed the others, but has devoured a very considerable part of them. It abounds in soft ground, in which it can dig with ease, and which furnishes it with a great supply of food. It forms its subterraneous apartments with great facility by its snout and feet, and with a very judicious reference to escape and comfort. It produces four or five young in the spring, in a nest a little beneath the surface, composed of moss and herbage. It is an animal injurious to the grounds of the farmer, by throwing up innumerable hills of mould, in the construction of its habitation, or the pursuit of its food, and many persons obtain their subsistence from the premiums, which are, on this account, given for their destruction. Moles can swim with considerable dexterity, and are thus furnished with the means of escape in sudden inundations, to which they are frequently exposed. In Ireland, the mole is unknown.

THE COMMON FROG.—This is an animal so well known, that it needs no description: but some of its properties are very singular. Its spring, or power of taking large leaps, is remarkably great, and it is the best swimmer of all four-footed animals. Its parts are finely adapted for those ends, the fore members of the body being very lightly made, the hind legs and thighs very long, and furnished with very strong muscles. While in a tadpole state, it is entirely a water animal, for in this element the spawn is cast. As soon as frogs are released from their tadpole state, they immediately take to land; and if the weather has been hot, and there fall any refreshing showers, the ground for a considerable space is perfectly blackened by myriads of these animalcules, seeking for some secure lurking places. Some persons not taking time to examine into this phenomenon, imagined them to have been generated in the clouds, and showered on the earth: but had they, like Mr. Derham, traced them to the next pool, they would have found a better solution of the difficulty. As frogs adhere closely to the backs of their own species, so we know they will do the same by fish. That they will injure, if not entirely kill carp, is a fact indisputable, from the following relation.

Not many years ago, on fishing a pond belonging to Mr. Pitt, of Encomb, Dorsetshire, great numbers of the carp were found, each with a frog mounted on it, the hind legs clinging to the back, and the fore legs fixed to the corner of

each eye of the fish, which were thin and greatly wasted, teased by carrying so disagreeable a load. The croaking of frogs is well known; and from that, in fenny countries, they are distinguished by ludicrous titles,—thus they are styled *Dutch nightingales*, and *Boston waites*. Yet there is a time of the year when they become mute, neither croaking nor opening their mouths for a whole month; this happens in the hot season, and that is in many places known to the country people by the name of the paddock-moon. It is said, that during that period their mouths are so closed, that no force (without killing the animal) will be capable of opening them. These, as well as other reptiles, feed but a small space of the year. Their food is flies, insects, and snails. During winter, frogs and toads remain in a torpid state; the last of which will dig into the earth, and cover themselves with almost the same agility as the mole.

Not less remarkable is THE COMMON TOAD.—This is the most deformed and hideous of all animals. The body is broad, the back flat, and covered with a pimply dusky hide; the belly large, swagging, and swelling out; the legs short, and its pace laboured and crawling; its retreat gloomy and filthy: in short, its general appearance is such as to strike one with disgust and horror. Yet it is said that its eyes are fine. Ælian and other ancient writers tell many ridiculous fables of the poison of the toad.

This animal was believed by some old writers to have a stone in its head fraught with great virtues, medical and magical: it was distinguished by the term of, the reptile, and called the toad-stone, bufonites, krottenstern, and other names, but all its fancied powers vanished on the discovery of its being nothing but the fossil tooth of the sea-wolf, or of some other flat-toothed fish, not unfrequent in our island, as well as several other countries. But these fables have been long exploded. And as to the notion of its being a poisonous animal, it is probable that its excessive deformity, joined to the faculty it has of emitting a juice from its pimples, and a dusky liquid from its hind parts, is the foundation of the report. That it has any noxious qualities, there seem to be no proofs in the smallest degree satisfactory, though we have heard many strange relations on that point. On the contrary, many have taken them in their naked hands, and held them long without receiving the least injury. It is also well known that quacks have eaten them, and have squeezed their juices into a glass, and drank them with impunity. They are also a common food to many animals; to buzzards, owls, Norfolk plovers, ducks, and snakes, which would not touch them, were they in any degree noxious.

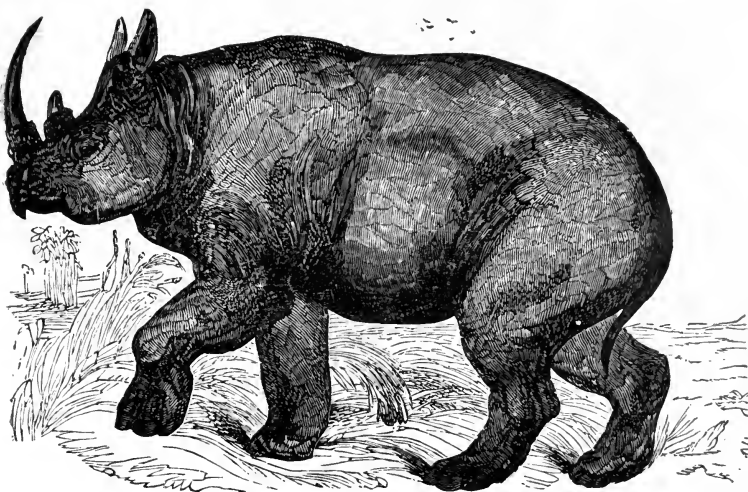
The fullest information concerning the nature and qualities of this animal is contained in letters from Mr. Arscott and Mr. Pitfield to Dr. Milles, communicated to Mr. Pennant; concerning a toad that lived above thirty-six years with them, was completely tame, and became so great a favourite that most of the ladies in the neighbourhood got the better of their prejudices so far as to be anxious to see it fed. Its food was insects, such as millepedes, spiders, ants, flies, &c. but it was particularly fond of flesh worms, which were bred on purpose for it. It never appeared in winter, but regularly made its appearance in the spring, when the warm weather commenced, climbing up a few steps, and waiting to be taken up, carried into the house, and fed upon a table. Before it attacked the insects, it fixed its eyes on them, and remained motionless for a quarter of a minute, when it attacked them by an instantaneous motion of its tongue, darted on the insect with such rapidity that the eye could not follow it, whereby the insect stuck to the tip of its tongue, and was instantly conveyed to its mouth. This favourite toad at last lost its life, in consequence of being attacked by a tame raven, which picked out one of its eyes; and although the toad was rescued, and lived a year longer, it never recovered its health or spirit. It never showed any signs of rage, being never provoked.

Our next subject is an animal of great bulk, THE RHINOCEROS.—This quadruped is exceeded in size only by the elephant. Its usual length, not including the tail, is twelve feet, and the circumference of its body nearly the same. Its nose is armed with a horny substance, projecting, in the full-grown animal, nearly three feet, and is a weapon of defence, which almost secures it from every attack. Even the tiger, with all his ferocity, is but very rarely daring enough to assail the rhinoceros. Its upper lip is of considerable length and pliability, acting like a species of snout, grasping the shoots of trees and various substances, and conveying them to the mouth; and it is capable of extension and contraction at the animal's convenience. The skin is, in some parts, so thick and hard as scarcely to be penetrable by the sharpest sabre, or even by a musket-ball. These animals are found in Bengal, Siam, China, and in several countries of Africa; but are far less numerous than the elephant, and of sequestered solitary habits. The female produces only one at a birth; and at the age of two years the horn is only an inch long, and at six only of the length of nine inches. The rhinoceros is not ferocious, unless provoked, when he exhibits paroxysms of rage and madness, and is highly dangerous to those who encounter him. He runs with great swiftness, and rushes through brakes and woods with an energy to which every thing yields. He is



RHINOCEROS.

Many varieties of this formidable animal are found in Asia and Africa. The above figure represents the Asiatic variety, which has but one horn.



RHINOCEROS.

Of the African rhinoceros, Mr. Cumming, the famous hunter, describes several kinds. The above figure represents the two-horned kind, which is found nowhere but in Africa. Mr. Cumming killed many of this kind.



THE ORNITHORHYNCHUS PARADOXUS

generally, however, quiet and inoffensive. Its food consists entirely of vegetables, the tender branches of trees, and succulent herbage, of which it will devour immense quantities. It delights in retired and cool situations, near lakes and streams, and appears to derive one of the highest satisfactions from the practice of rolling and wallowing in mud,—in this respect bearing a striking resemblance to the hog.

This animal was exhibited, by Augustus, to the Romans, and is supposed to be the unicorn of the scripture, as it possesses the properties ascribed to that animal, of magnitude, strength, and swiftness, in addition to that peculiarity of a single horn, which may be considered as establishing their identity. This animal can distinguish, by its sight, only what is directly before it, and always, when pursued, takes the course immediately before it, almost without the slightest deviation from a right line, removing every impediment. Its sense of smelling is very acute, and also of hearing, and, on both these accounts, the hunters approach him against the wind. In general, they watch his lying down to sleep, when, advancing with the greatest circumspection, they discharge their muskets into his belly. The flesh is eaten both in Africa and India.

We now proceed to THE CROCODILE.—This animal is a native both of Africa and Asia, but is most frequently found in the former, inhabiting its vast rivers, and particularly the Niger and the Nile. It has occasionally been seen of the length of even thirty feet, and instances of its attaining that of twenty are by no means uncommon. It principally subsists on fish, but such is its voracity, that it seizes almost every thing that comes within its reach. The upper part of its body is covered with a species of armour, so thick and firm, as to be scarcely penetrable with a musket-ball; and the whole body has the appearance of an elaborate covering of carved work. It is an oviparous animal, and its eggs scarcely exceed in size those of a goose. These eggs are regarded as luxuries by the natives of some countries of Africa, who will also with great relish partake of the flesh of the crocodile itself. When young, the small size and weak state of the crocodile prevent its being injurious to any animal of considerable bulk or strength; and those which have been brought living to England have by no means indicated that ferocious and devouring character which they have been generally described to possess; a circumstance probably owing to the change of climate, and the reducing effect of confinement.

In its native climate its power and propensity to destruction are unquestionably great, and excite in the inhabitants of the territories near its haunts a high degree of terror. It lies in

wait near the banks of rivers, and, with a sudden spring, seizes any animal that approaches within its reach, swallowing it with an instantaneous effort, and then rushing back into its watery recesses, till renewed appetite stimulates the repetition of its insidious exertions. These animals were occasionally exhibited by the Romans among their collections of the natural wonders of the provinces; and Scaurus and Augustus are both recorded to have entertained the people with a sight of these new and formidable objects.

It is reported by some travellers, that crocodiles are capable of being tamed, and are actually kept in a condition of harmless domestication at the grounds and artificial lakes of some African princes, chiefly as appendages of royal splendour and magnificence. A single negro will often attack a crocodile, and by spearing it between the scales of the belly, where it is easily penetrable, secure its destruction. In some regions these animals are hunted by dogs, which, however, are carefully disciplined to the exercise, and are armed with collars of iron spikes.

Aristotle appears to have been the first who asserted that the under jaw of the crocodile was immoveable, and from him it was transmitted and believed for a long succession of ages. But the motion of the jaw in this animal is similar to that of all other quadrupeds. The ancients also thought it destitute of a tongue; an idea equally false. The tongue, however, is more fixed in this than in other animals, to the sides of its mouth, and less capable, therefore, of being protruded.—The eggs of the crocodile are deposited in the mud or sand of the banks of rivers, and immediately on being hatched, the young move towards the water; in their passage to which, however, vast numbers are intercepted by ichneumons and birds, which watch their progress.

The ALLIGATOR, or AMERICAN CROCODILE, has a vast mouth, furnished with sharp teeth; from the back to the end of the tail, it is serrated; its skin is tough and brown, and covered on the sides with tubercles. This dreadful species, which grows to the length of 17 or 18 feet, is found in the warmer parts of North America, and is most numerous, fierce, and ravenous, towards the south. Yet, in Carolina, it never devours the human species, but on the contrary, shuns mankind; it, however, kills dogs as they swim the rivers, and hogs which feed in the swamps. It is often seen floating like a log of wood on the surface of the water, and is mistaken for such by dogs and other animals, which it seizes, draws under water, and devours. Like the wolf, when pressed by long hunger, it will swallow mud, and even stones, and pieces of wood. They often get into the wears in pursuit of fish, and

do much mischief by tearing them to pieces. They are torpid during winter, in Carolina, and retire into their dens, which they form by burrowing far under ground. They make the entrance under water, and work upwards. In spring they quit their retreats, and resort to the rivers, and chiefly seek their prey near the mouth, where the water is brackish. They roar and make a dreadful noise at first leaving their dens, and against bad weather. The female lays a vast number of eggs in the sand, near the banks of lakes and rivers, and leaves them to be hatched by the sun: multitudes are destroyed as soon as hatched, either by their own species, or by fish of prey. In South America, the carrion vulture is the instrument of Providence to destroy multitudes; and it thus prevents the country from being rendered uninhabitable.

The following account of EASTERN ALLIGATORS is extracted from Forbes's Oriental Memoirs.

The eastern districts of Travancore, intersected by lakes and rivers, abound with amphibious animals, especially alligators and seals. There seems to be no essential difference between the alligator of India, and the Egyptian crocodile; *lacerta alligator*, and *lacertus crocodilus*. Naturalists seem to confine the alligator to South America, the crocodile to Asia and Africa; but in India the *lacerta crocodilus*, generally called the alligator, is from five to twenty feet long, shaped like the genus to which he belongs; the back is covered with impenetrable scales; the legs short, with five spreading toes on the fore feet, and four in a straight line on the hinder, armed with claws: the alligator moves slowly, its whole formation being calculated for strength, the back bone firmly jointed, and the tail a most formidable weapon: in the river, he eagerly springs on the wretch unfortunately bathing within his reach, and either knocks him down with his tail, or opens his wide mouth for his destruction, armed with numerous sharp teeth of various lengths; by which, like the shark, he sometimes severs the human body at a single bite: the annals of the Nile and Ganges, although wonderful, are not fabulous. The upper jaw only of the alligator was thought to be moveable; but that is now completely disproved: the eyes are of a dull green, with a brilliant pupil, covered by a transparent pellicle, moveable as in birds: from the heads of those of large size, musk is frequently extracted.

It may not be improper in this place to introduce to the reader's notice, one of the greatest curiosities of its kind, which late ages have produced; that is, a FOSSIL CROCODILE.

This is the skeleton of a large crocodile, almost entire, found at a great depth under ground, bedded in stone. This

was in the possession of Linkius, who wrote many pieces in natural history, and particularly an accurate description of this curious fossil. It was found in the side of a large mountain in the midland part of Germany, and in a stratum of black fossil stone, somewhat like our common slate, but of a coarser texture, the same with that in which the fossil fishes in many parts of the world are found. This skeleton had the back and ribs very plain, and was of a much deeper black than the rest of the stone; as is also the case with the fossil fishes, which are preserved in this manner. The part of the stone where the head lay was not found; this being broken off just at the shoulders, but that irregularly; so that in one place a part of the back of the head was visible in its natural form. The two shoulder-bones were very fair, and three of the feet were well preserved: the legs were of their natural shape and size; and the feet preserved even to the extremities of the five toes of each.

Our next subject is named *THE ORNITHORHYNCHUS PARADOXUS*, and is a very singular quadruped, remarkable for its structure. The head is similar to that of a duck, which would lead to the supposition that it belonged to an aquatic bird. Both jaws are as broad and low as those in a duck, and the calvaria has no traces of a suture, as is generally the case in full-grown birds. In the cavity of the skull there is a considerably bony falx, which is situated along the middle of the os frontis, and the ossa bregmatis. The mandible of this animal consists of a beak, the under part of which has its margin indented as in ducks, and of the proper instrument for chewing that is situated behind within the cheeks. Dr. Shaw says it has no teeth, though Mr. Home found, in a specimen examined by him, two small and flat molar teeth on each side of the jaws. The fore part of this mandible, or beak, is covered and bordered with a coriaceous skin, in which three parts are to be distinguished, within the proper integument of the beak. Into these three parts of that membrane numerous nerves are distributed, intended, probably, as the organs of feeling, a sense which, besides men, few mammalia enjoy; that is, few animals possess the faculty of distinguishing the form of external objects and their qualities, by organs destined for that purpose,—a property very different from the common feeling, by which every animal is able to perceive the temperature and presence of sensible objects, but without being informed, by the touch, of their peculiar qualities. Thus the skin in the wings of the bat, and its ear, are supposed the organs of common feeling, by means of which they are enabled to flutter, after being blinded, without flying against any thing. The whiskers of many animals appear

likewise to serve the same purpose of informing them of the presence of sensible bodies, and hence they have been compared to the antennæ of insects.

But to return to the ornithorhynchus : It is an animal which from the similarity of its abode, and the manner of searching for food, agrees much with the duck, on which account it has been provided with an organ for touching, viz. with the integument of the beak, richly endowed with nerves. This instance of analogy in the structure of a singular organ of sense in two species of animals, from classes quite different, is a most curious circumstance in comparative physiology, and hence the ornithorhynchus is looked upon as one of the most remarkable phenomena in zoology.

We shall close this chapter with an account of THE MARMOT, or MOUNTAIN-RAT OF SWITZERLAND.—This rat is almost the size of a leveret, and resembles a common rat very much in appearance. These little creatures live together in societies, and have different dwellings for winter and summer; their fore paws are remarkably strong, which qualifies them for scooping out their burrows. The same form is always preserved in the construction of their dwellings, which consist of a long passage, just big enough to let the marmot enter, leading to two apartments; the largest of these serves the whole family for a chamber, where they lie close together, in a torpid state, rolled up like hedge-hogs, during the cold season, as dormice do in England. When they betake themselves to their winter quarters, after having lined their chamber with soft hay, they carefully stop up the entrance with a sort of cement, which they make of earth, mixed with stones and dry grass. Before they collect the grass, either for food, or for their winter habitations, they form themselves into a circle, sitting on their hind legs, looking with a cautious eye on every side. If the least thing stirs that alarms them, the first which perceives it makes a particular kind of cry, which its next neighbour repeats, and so on till it goes round, when they hastily make their escape. They are often seen upon the slopes of the Alps, where grass is in plenty; but they love a warm sheltered situation, and change their residence according to the season

CHAP. XIV.

CURIOSITIES RESPECTING ANIMALS.—(Continued.)

The Elephant—Fossil Elephant—The Chameleon—The Common Tortoise—Orang-Outang—The Unicorn—The Common Seal—The Ursine Seal—American Natural History.

Let no presuming impious railer tax
Creative wisdom, as if aught was form'd
In vain, or not for admirable ends.

Thomson.

THE ELEPHANT.—This is a very wonderful animal; and has, both in ancient and modern times, been duly estimated in the Eastern world. His virtues are thus enumerated by Buffon:—To form a just estimation of the elephant, he must be allowed to possess the sagacity of the beaver, the address of the ape, the sentiment of the dog, together with the peculiar advantages of strength, largeness, and long duration of life. Neither should we overlook his arms or tusks, which enable him to transfix and conquer the lion! We should also consider that the earth shakes under his feet; that with his trunk, as with a hand, he tears up trees; that by a push of his body he makes a breach in a wall; that, though tremendous in strength, he is rendered still more invincible by his enormous mass, and by the thickness of his skin; that he can carry on his back an armed tower, filled with many warriors; that he works machines, and carries burdens, which six horses are unable to move; that to this prodigious strength he adds courage, prudence, coolness, and punctual obedience; that he preserves moderation even in his most violent passions; that he is constant and impetuous in love; that when in anger, he mistakes not his friends; that he never attacks any but those who offend him; that he remembers favours as long as injuries; that having no appetite for flesh, he feeds on vegetables alone, and is born an enemy to no living creature; and, in fine, that he is universally beloved, because all animals respect, and none have any reason to fear him!

The following account is extracted from Forbes's Oriental Memoirs, a highly interesting work.

“The largest Elephants are from ten to eleven feet in height, some are said to exceed it; the average is eight or nine feet. They are fifty or sixty years before they arrive at their full growth; the female goes with young eighteen months, and seldom produces more than one at a birth, which she suckles until it is five years old: its natural life is about one hundred

and twenty years. The Indians are remarkably fond of these animals, especially when they have been long in their service. I have seen an elephant valued at twenty thousand rupees: the common price of a docile well-trained elephant is five or six thousand; and in the countries where they are indigenous, the Company contract for them at five hundred rupees each, when they must be seven feet high at the shoulders. The mode of catching and training the wild elephants is now well known; their price increases with their merit during the course of education. Some, for their extraordinary qualities, become in a manner invaluable; when these are purchased, no compensation induces a wealthy owner to part with them.

"The skin of the elephant is generally of a dark grey, sometimes almost black; the face frequently painted with a variety of colours; and the abundance and splendour of his trappings add much to his consequence. The Mogul princes allowed five men and a boy to each elephant: the chief of them, called the mahawut, rode upon his neck, to guide him; another sat upon his rump, and assisted in battle; the rest supplied him with food and water, and performed the necessary services. Elephants bred to war, and well disciplined, will stand firm against a volley of musketry, and never give way unless severely wounded. I have seen one of those animals, with upwards of thirty bullets in the fleshy parts of his body, perfectly recovered from his wounds. All are not equally docile; and when an enraged elephant retreats from battle, nothing can withstand his fury; the driver having no longer a command, friends and foes are involved in undistinguished ruin."

The elephants in the army of Antiochus were provoked to fight by shewing them the blood of grapes and mulberries. The history of the Maccabees informs us, that "to every elephant they appointed a thousand men, armed with coats of mail, and five hundred horsemen of the best: these were ready at every occasion; wherever the beast was, and whithersoever he went, they went also; and upon the elephant were strong towers of wood, filled with armed men, besides the Indian that ruled them."

"Elephants in peace and war know their duty, and are more obedient to the word of command than many rational beings. It is said they can travel, on an emergency, two hundred miles in forty-eight hours; but will hold out for a month at the rate of forty or fifty miles a day, with cheerfulness and alacrity. I performed many long journeys upon an elephant given by Ragobah to Colonel Keating. Nothing could exceed the sagacity, docility, and affection, of this noble quadruped: if I stopped to enjoy a prospect, he remained immoveable until my sketch was finished; if I wished for ripe mangoes growing

out of the common reach, he selected the most fruitful branch, and breaking it off with his trunk, offered it to the driver for the company in the houdah, accepting of any part given to himself with a respectful salem, by raising his trunk three times above his head, in the manner of the Oriental obeisance, and as often did he express his thanks by a murmuring noise. When a bough obstructed the houdah, he twisted his trunk around it, and, though of considerable magnitude, broke it off with ease, and often gathered a leafy branch, either to keep off the flies, or as a fan to agitate the air around him, by waving it with his trunk ; he generally paid a visit at the tent door during breakfast, to procure sugar-candy or fruit, and be cheered by the encomiums and caresses he deservedly met with ; no spaniel could be more innocent, playful, or fonder of those who noticed him, than this docile animal, that on particular occasions appeared conscious of his exaltation above the brute creation."

The following account of the docility of the elephant, from ancient writers, will interest the reader.

They have been taught to adore the king, says Aristotle, to dance, to throw stones at a mark, to cast up stones at a mark, to catch them again in their fall, and to walk upon ropes: Galba was the first, says Suetonius, that exhibited this at Rome. And these things they learned with such care, that they have often been found practising in the night what had been taught them in the day. They write too, says Pliny, speaking of one which wrote in the Greek tongue, *Ipse ego hæc scripsi et spolia lettica dicavi*. I myself saw, says Ælian, one of them writing Roman letters on a tablet with his trunk ; and the letters he made were not ragged, but straight and even ; and his eyes were fixed upon the tablet, as one that was serious. And in the plays that Germanicus Cæsar shewed at Rome, there were twelve elephants, six males and six females ; these were clothed as men and women. At the command of their keeper, they danced, and performed all the gestures of a mimic. At last they were brought where they were to feast ; a table was covered with all kinds of dainties, and beds were covered with purple carpets, after the manner of the Roman eating, for them to lie upon. Upon these they lay down, and, at the signal given, they reached out their trunks to the table, and with great modesty fell to eating, and ate and drank as civil men would do."

This seems to be the most proper place for introducing an account of THE MAMMOTH.

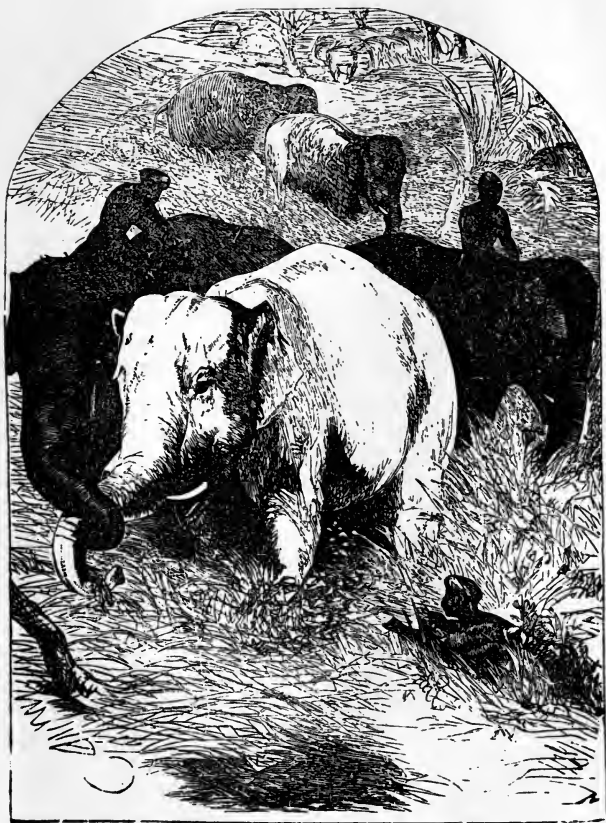
The Mammoth is a fossil Elephant ; a most remarkable one of which was found in the ice, at the mouth of the river Lena, in Siberia.



VAMPIRE BAT.



ROUGETTE.



HUNTING THE WHITE ELEPHANT.

The following account is extracted from an abridgment of a paper by Dr. Tilesius, from the Journal of Science.

"In the year 1805, when the Russian expedition under Krusenstern returned for the third time to Kamschatka, Patagof, master of a Russian ship, bringing victualling stores from Okotsk, related that he had lately seen a mammoth elephant, dug up on the shores of the Frozen Ocean, clothed with a hairy skin; and shewed, in confirmation of the fact, some hair three or four inches long, of a reddish black colour, a little thicker than horse hair; which he had taken from the skin of the animal: this he gave to me, says Dr. Tilesius, and I sent it to professor Blumembach. No further knowledge has been obtained on this subject, and unfortunately Patagof was not employed by any of our Societies to return to Siberia. Thus was this curious fact consigned to oblivion; nor should we now possess any information respecting the carcase of the mammoth, if the rumour of its discovery had not reached Mr. Adams, a man of great ardour in pursuit of science, who undertook the labour of a journey to these frozen regions, and of preparing these gigantic remains, and transporting them to a great distance.

"The preservation of the flesh of the mammoth through a long series of ages, is not to be wondered at, when we recollect the constant cold and frost of the climate in which it was found. It is a common practice to preserve meat and berries throughout the winter, by freezing them, and to send fish, and all other provisions, annually at that period, from the most remote of the northern provinces, to St. Petersburg, and other parts of the empire.

"I was told, at Jakutsk, says Mr. Adams, by the merchant Papoff, chief of the body of merchants in that town, that there had been discovered on the shores of the Frozen Ocean, near the mouth of the river Lena, an animal of extraordinary magnitude. The flesh, the skin, and the hair, were in a state of preservation, and it was supposed that the fossil production known under the name of mammoth's horns, must have belonged to an animal of this species. The news of this interesting discovery determined me to hasten the journey which I had in contemplation, for the purpose of visiting the shores of the Lena, as far as the Frozen Ocean; wishing to preserve these precious remains, which might otherwise be lost.

"The third day of our journey we pitched our tents, at some hundred paces distant from the mammoth, on a hill, called Kembisaga-Shæta. Schumachof, a Tungusian chief, related to me, nearly in these terms, the history of the discovery of the mammoth.

"The Tungusians, who are a wandering people, remain but a little time in the same place. Those who live in the forests,

often take ten years or more, to travel over the vast regions between the mountains: during this time, they do not once return to their habitations. Each family lives isolated, and knows no other society. If, during the course of several years, two friends meet by chance, they then communicate to each other their adventures, their different successes in hunting, and the number of skins they have obtained. After having passed some days together, and consumed the few provisions they had, they separate cheerfully, carrying each other's compliments to their acquaintance, and trusting to Providence for another meeting. The Tungusians inhabiting the coast differ from the former, in having more regular and fixed habitations, and in collecting together at certain seasons for fishing and hunting. During winter, they inhabit cottages, built side by side, so that they form villages. It is to one of these annual trips that we owe the discovery of the mammoth.

"Towards the end of the month of August, when the fishing season in the Lena is over, Schumachof generally goes with his brothers to the peninsula of Tamut, where they employ themselves in hunting, and where the fresh fish of the sea offer them a wholesome and agreeable food. In 1799, he had constructed for his wife some cabins on the banks of the lake Oncoul, and had embarked, to seek along the coasts for mammoth horns. One day, he perceived along the blocks of ice a shapeless mass, not at all resembling the large pieces of floating wood which are commonly found there. To observe it nearer, he landed, climbed up a rock, and examined this new object on all sides, but without being able to discover what it was.

"The following year, 1800, he found the carcase of a Walrus, (*Trichecus Rosmarus*.) He perceived, at the same time, that the mass he had before seen was more disengaged from the blocks of ice, and had two projecting parts, but was still unable to make out its nature. Towards the end of the following summer, 1801, the entire side of the animal, and one of his tusks, were quite free from the ice. On his return to the borders of the lake Oncoul, he communicated this extraordinary discovery to his wife and some of his friends; but the way in which they considered the matter filled him with grief. The old men related, on this occasion, their having heard their fathers say, that a similar monster had been formerly seen in the same peninsula, and that all the family of the discoverer had died soon afterwards. The mammoth was therefore considered as an augury of future calamity, and the Tungusian chief was so alarmed, that he fell seriously ill; but becoming convalescent, his first idea was the profit which he might obtain by selling the tusks of the animal, which

were of extraordinary size and beauty. He ordered that the place where the mammoth was found should be carefully concealed, and that strangers should, under different pretexts, be diverted from it, at the same time charging trust-worthy people to watch that the treasure was not carried off.

"But the summer of 1802, which was less warm and more windy than common, caused the mammoth to remain buried in the ice, which had scarcely melted at all. At length, towards the end of the fifth year, 1803, the ardent wishes of Schumachof were happily accomplished; for the part of the ice between the earth and the mammoth having melted more rapidly than the rest, the plane of its support became inclined, and this enormous mass fell, by its own weight, on a bank of sand. Of this, two Tungusians, who accompanied me, were witnesses.

"In the month of March, 1804, Schumachof came to his mammoth, and having cut off his horns (or tusks) he exchanged them with the merchant Bultunof, for goods of the value of fifty rubles.

"Two years afterwards, or the seventh after the discovery of the mammoth, I fortunately traversed these distant and desert regions, and I congratulate myself in being able to prove a fact which appears so improbable. I found the mammoth still in the same place, but altogether mutilated. The prejudices being dissipated, because the Tungusian chief had recovered his health, there was no obstacle to prevent approach to the carcase of the mammoth; the proprietor was content with his profit from the tusks, and the Jakutski of the neighbourhood seized upon the flesh, with which they fed their dogs during the scarcity. Wild beasts, such as white bears, wolves, wolverenes, and foxes, also fed upon it, and the traces of their footsteps were seen around. The skeleton, almost entirely cleared of its flesh, remained whole, with the exception of one fore leg. The head was covered with a dry skin; one of the ears, well preserved, was furnished with a tuft of hairs. All these parts have necessarily been injured in transporting them a distance of 11,000 wersts (7,330 miles:) yet the eyes have been preserved, and the pupil of the left eye can still be distinguished. The point of the lower lip had been gnawed; and the upper one having been destroyed, the teeth could be perceived. The brain was still in the cranium, but appeared dried up.

"The parts least injured are one fore foot and one hind foot; they are covered with skin, and have still the sole attached. According to the assertion of the Tungusian chief, the animal was so fat and well fed, that its belly hung down below the joints of the knees.

"This mammoth was a male, with a long mane on the neck,

but without tail or proboscis.* The skin, of which I possess three-fourths, is of a dark grey colour, covered with a reddish wool, and black hairs. The dampness of the spot where the animal had lain so long, had in some degree destroyed the hair. The entire carcase, of which I collected the bones on the spot, is four archines (9 ft. 4 in.) high, and seven archines (16 ft. 4 in.) long, from the point of the nose to the end of the tail, without including the tusks, which are a toise and a half† in length; the two together weighed 360 lbs. avoirdupois; the head alone, without the tusks, weighs 11 poods and a half, 414 lbs. avoirdupois.

"The principal object of my care was to separate the bones, to arrange them, and put them up safely, which was done with particular attention. I had the satisfaction to find the other scapula, which had remained not far off. I next detached the preserved parts. The skin was of such extraordinary weight, that ten persons found great difficulty in transporting it to the shore. After this, I dug the ground in different places, to ascertain whether any of its bones were buried, but principally to collect all the hairs,‡ which the white bears had trod into the ground, while devouring the flesh. Although this was difficult, for the want of proper instruments, I succeeded in collecting more than a pood (36 pounds) of hair in a few days the work was completed, and I found myself in possession of a treasure which amply recompensed me for the fatigues and dangers of the journey, and the considerable expenses of the enterprise.

"The place where I found the mammoth is about sixty paces distant from the shore, and nearly 100 paces from the escarpment of the ice from which it had fallen. This escarpment occupies exactly the middle between the two points of the peninsula, and is three wersts long (two miles), and in the place where the mammoth was found, this rock has a perpendicular elevation of 30 or 40 toises. Its substance is a clear pure ice; it inclines towards the sea; its top is covered with a layer of moss and friable earth, half an archine (14 inches) in thickness. During the heat of the month of July a part of this crust is melted, but the rest remains frozen. Curiosity induced me to ascend two other hills at some distance from the sea; they were of the same substance, and less covered with moss. In various places were seen enormous pieces of wood, of all the

* The places of the insertion of the muscles of the proboscis are visible on the skull; it was probably devoured, as well as the end of the tail.

† 9 ft. 6 in. measuring along the curve. The distance from the base of the root of the tusk to the point, is 3 ft. 7 in.

‡ On the arrival of the skin at Petersburg, it was totally devoid of hair.

kinds produced in Siberia ; and also mammoths' horns, in great numbers, appeared between the hollows of the rocks ; they all were of astonishing freshness.

"How all these things could become collected there, is a question as curious as it is difficult to resolve. The inhabitants of the coast call this kind of wood *Adamschina*, and distinguish it from the floating pieces of wood which are brought down by the large rivers to the ocean, and collect in masses on the shores of the Frozen Sea. The latter are called *Noachina*. I have seen, when the ice melts, large lumps of earth detached from the hills, mix with the water, and form thick muddy torrents, which roll slowly towards the sea. This earth forms wedges, which fill up the spaces between the blocks of ice.

"The escarpment of ice was 35 to 40 toises high ; and, according to the report of the Tungusians, the animal was, when they first saw it, seven toises below the surface of the ice, &c.

"On arriving with the mammoth at *Bonchaya*, our first care was to separate the remaining flesh and ligaments from the bones, which were then packed up. When I arrived at *Jakutsk*, I had the good fortune to re-purchase the tusks, and from thence expedited the whole to *St. Petersburg*.

"The skeleton is now put up in the museum of the Academy, and the skin still remains attached to the head and feet. The mammoth is described by *M. Cuvier* as a different species from either of the two elephants living at the present day, the African or the Indian. It is distinguished from them by the teeth, and by the size of the tusks, which are from ten to fifteen feet long, much curved, and have a spiral turn outwards. The alveoli of the tusks are also larger, and are protruded farther. The neck is shorter, the spinal processes larger, all the bones of the skeleton are stronger, and the scabrous surfaces for the insertion of the muscles more prominent, than in the other species. The skin being covered with thick hair, induces *M. Cuvier* to consider that it was the inhabitant of a cold region. The form of the head is also different from that of the living species, as well as the arrangement of the lines of the enamel of the teeth."

The mammoth more nearly resembles the Indian than the African species of elephant.

A part of the skin, and some of the hair of this animal, was sent by *Mr. Adams* to the late *Sir Joseph Banks*, who presented them to the museum of the Royal College of Surgeons.

From *Forbes's* work we extract the following particulars respecting THE CHAMELEON.

The greatest curiosity in the East, says *Forbes*, is the Cha-

melecn. found in every thicket. I kept one for several weeks, of which, as it differed in many respects from those described in Arabia, and other places, I shall mention a few particulars. The chameleon of the Concan, including the tail, is about nine inches long; the body only half that length, varying in circumference, as it is more or less inflated; the head, like that of a fish, is immoveably fixed to the shoulders; but every inconvenience is removed by the structure of its eyes, which, like spheres rolling on an invisible axis, are placed in deep cavities, projecting from the head; through a small perforation in the exterior convexity, appears a bright pupil, surrounded with a yellow iris, which, by the singular formation and motion of the eye, enables the animal to see what passes before, behind, or on either side; and it can give one eye all these motions, while the other remains perfectly still; a hard rising protects these delicate organs, another extends from the forehead to the nostrils: the mouth is large, and furnished with teeth, with a tongue half the length of the body, and hollow like an elephant's trunk; it darts nimbly at flies and other insects, which it seems to prefer to the aerial food generally supposed to be its sustenance. The legs are longer than usual in the licerta genus; on the fore feet are three toes nearest the body, and two without; the hinder exactly the reverse; with these claws it clings fast to the branches, to which it sometimes entwines itself by the tail, and remains suspended; the skin is granulated like shagreen, except a range of hard excrescences, or denticulations, on the ridge of the back, which are always of the same colour as the body; whereas a row of similar projections beneath continue perfectly white, notwithstanding any metamorphosis of the animal.

The general colour of the chameleon so long in my possession, was a pleasant green, spotted with pale blue; from this it changed to a bright yellow, dark olive, and a dull green; but never appeared to such advantage as when irritated, or a dog approached it; the body was then considerably inflated, and the skin clouded like tortoise-shell, its shades of yellow, orange, green, and black. A black object always caused an almost instantaneous transformation: the room appropriated for its accommodation was skirted by a board painted black; this the chameleon carefully avoided; but if he accidentally drew near it, or we placed a black hat in his way, he was reduced to a hideous skeleton, and, from the most lively tints, became black as jet: on removing the cause, the effect as suddenly ceased; the sable hue was succeeded by a brilliant colouring, and the body was again inflated.

Our next subject is THE COMMON TORTOISE.—The weight of this animal is three pounds, and the length of its shell

about seven inches. It abounds in the countries surrounding the Mediterranean, and particularly in Greece, where the inhabitants not only eat its flesh and eggs, but frequently swallow its warm blood. In September or October it conceals itself, remaining torp'd till February, when it re-appears. In June it lays its eggs, in holes exposed to the full beams of the sun, by which they are matured. The males frequently engage in severe conflicts, and strike their heads against each other with great violence, and very loud sounds. Tortoises attain most extraordinary longevity, and one was ascertained to have lived in the gardens of Lambeth to the age of nearly 120 years. Its shell is preserved in the archiepiscopal palace. So reluctant is the vital principle to quit these animals, that Shaw informs us, from Redi, that one of them lived for six months after all its brain was taken out, moving its limbs, and walking, as before. Another lived twenty-three days after its head was cut off, and the head itself opened and closed its jaws for a quarter of an hour after its separation from the body. It may not only be tamed, but has in several instances exhibited proofs, in that state, of considerable sagacity in distinguishing its benefactors, and of grateful attachment in return for their kindness, notwithstanding its general sluggishness and torpor. It will answer the purpose of a barometer, and uniformly indicates the fall of rain before night, when it takes its food with great rapidity, and walks with a sort of mincing and elate step. It appears to dislike rain with extreme aversion, and is discomfited and driven back by only a few and scarcely perceivable drops.

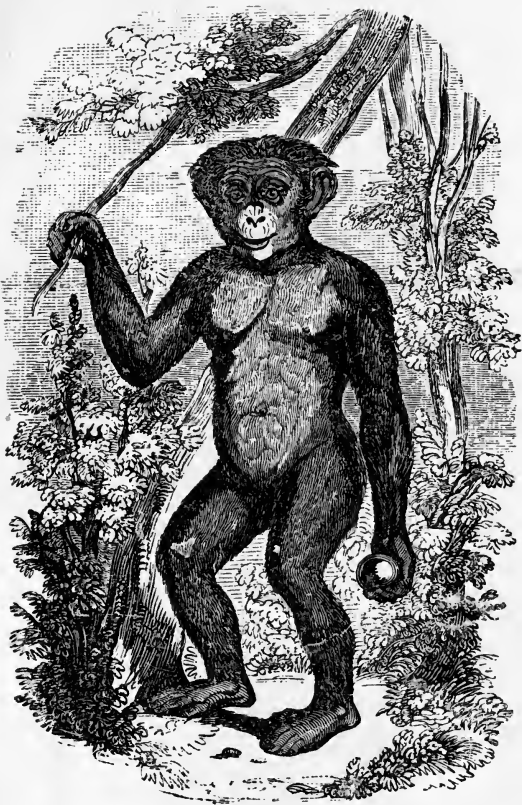
The following particulars respecting the Instinct of the Tortoise, are copied from Vaillant's Travels in Africa.—“It is very remarkable, that when the waters are dried up by excessive heat, the tortoises, which always seek for moisture, bury themselves under the earth, in proportion as the surface of it becomes dry. To find them, it is then sufficient to dig to a considerable depth, in the spot where they have concealed themselves. They remain as if asleep, and never awake, or make their appearance, until the rainy season has filled the ponds and small lakes, on the borders of which they deposit their eggs, where they continue exposed to the air; they are as large as those of a pigeon; they leave to the heat and the sun the care of hatching them. These eggs have an excellent taste; the white, which never grows hard by the force of fire, preserves the transparency of a bluish jelly. I do not know whether this instinct be common to every species of water tortoises, and whether they all employ the same means; but this I can assert, that every time, during the great droughts, when I wished to procure any of them, by digging in those places where there had been water, I always found as many

as I had occasion for. This method of fishing, or whatever else it may be called, was not new to me; for at Surinam a stratagem of the same kind is employed to catch two species of fish, which bury themselves also; and which are called, one the *varappe*, and the other the *gorret* or the *kevikwi*."

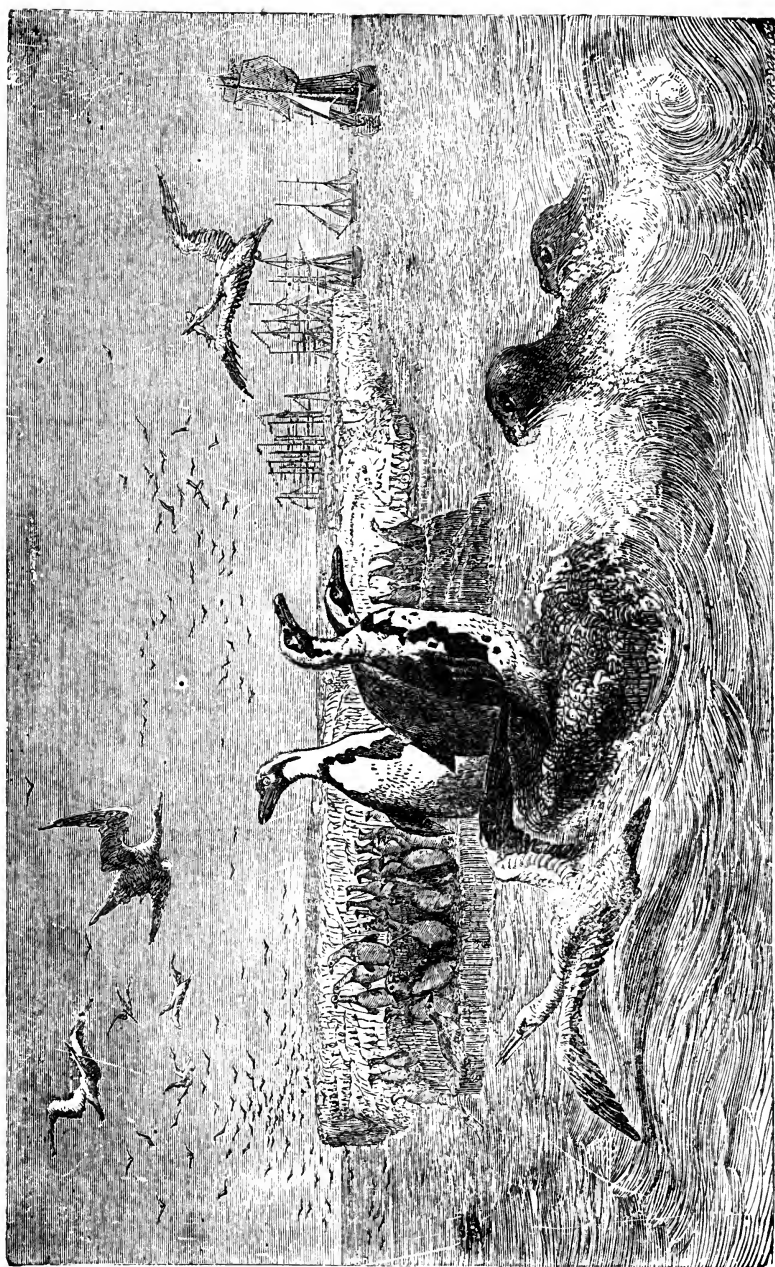
The next curious animal which we shall consider, is, THE ORANG-OUTANG.—This animal is sometimes called the satyr, great ape, or man of the woods. It is a native of the warmer parts of Africa and India, as well as of some of the Indian islands, where it resides principally in woods, and is supposed to feed, like most others of this genus, on fruits. The orang-outang appears to admit of considerable variety in point of colour, size, and proportions; and there is reason to believe, that, in reality, there may be two or three kinds, which, though nearly approximated as to general similitude, are yet specifically distinct. The specimens imported into Europe have rarely exceeded the height of two or three feet, and were supposed to be young animals; but it is said the full-grown ones are, at least, six feet in height. The general colour seems to be dusky or brown, in some ferruginous or reddish brown; and in others coal-black, with the skin itself white. The face is bare; the ears, hands, and feet, nearly similar to the human, and the whole appearance such as to exhibit the most striking approximation to the human figure. The likeness, however, is only a general one, and the structure of the hands and feet, when examined with anatomical exactness, seems to prove, in the opinion of those most capable of judging with accuracy on the subject, that the animal was principally designed by nature for the quadrupedal manner of walking, and not for an upright posture, which is only occasionally assumed, and which, in those exhibited to the public, is, perhaps, rather owing to instruction, than truly natural.

The Count de Buffon, indeed, makes it one of the distinctive characters of the real or proper apes, (among which the orang-outang is the chief,) to walk erect on two legs only; and it must be granted, that these animals support an upright position much more easily and readily than most other quadrupeds, and may probably be very often seen in this attitude even in a state of nature.

The manners of the orang-outang, when in captivity, are gentle, and perfectly void of that disgusting ferocity so conspicuous in some of the larger baboons and monkeys. The orang-outang is mild and docile, and may be taught to perform, with dexterity, a variety of actions in domestic life. Thus, it has been taught to sit at table, and, in its manner of feeding and general behaviour, to imitate the company in which it was placed; to pour out tea, and drink it, without



THE ORANG-OUTANG,
Ape, or Man of the Woods.



SEAL-HUNTING.

awkwardness or constraint; to prepare its bed with exactness, and compose itself to sleep in a proper manner. Such are the actions of one which was exhibited in London, in the year 1738; and the Count de Buffon relates nearly similar particulars of that which he saw at Paris.

Dr. Tyson, who, about the close of the last century, gave a very exact description of a young orang-outang, then exhibited in the metropolis, assures us, that in many of its actions it seemed to display a very high degree of sagacity, and was of a disposition uncommonly gentle; "the most gentle and loving creature that could be. Those that he knew on ship-board, he would come and embrace with the greatest tenderness, opening their bosoms, and clasping his hands about them; and, as I was informed, though there were monkeys on board, yet it was observed, he would never associate with them, and, as if nothing akin to them, would always avoid their company."

But, however docile and gentle when taken young, and instructed in its behaviour, it is said to be possessed of great ferocity in its native state, and is considered as a dangerous animal, capable of readily overpowering the strongest man. Its swiftness is equal to its strength, and for this reason it is but rarely to be obtained in its full-grown state, the young alone being taken.

The next is, **THE UNICORN**.—The following account is extracted from the *St. James's Chronicle* of Dec. 19 to 21, 1820.

"We have no doubt that a little time will bring to light many objects of natural history, peculiar to the elevated regions of central Asia, and hitherto unknown in the animal, vegetable, and mineral kingdoms, particularly in the two former. This is an opinion which we have long entertained; but we are led to the expression of it on the present occasion, by having been favoured with the perusal of a most interesting communication from Major Latter, commanding in the Rajah of Sikkim's territories, in the hilly country east of Nepaul, addressed to Adjutant-General Nicol, and transmitted by him to the Marquis of Hastings. This important paper explicitly states, that the Unicorn, so long considered a fabulous animal, actually exists at this moment in the interior of Thibet, where it is well known to the inhabitants.

"This (we copy from the Major's letter) is a very curious fact, and it may be necessary to mention how the circumstance became known to me. In a Thibetian manuscript, containing the names of different animals, procured the other day from the hills, the Unicorn is classed under the head of those whose hoofs are divided; it is called the One-horned Tso'-po.

Upon inquiring what kind of animal it was, to our astonishment, the person who brought me the manuscript, described exactly the Unicorn of the ancients: saying, that it was a native of the interior of Thibet, about the size of a tattoo (a horse from 12 to 13 hands high,) fierce, and extremely wild; seldom, if ever, caught alive, but frequently shot; and that the flesh was used for food.

"The person (Major Latter adds) who gave me this information, has repeatedly seen these animals, and eaten the flesh of them. They go together in herds, like our wild buffaloes, and are very frequently to be met with on the borders of the great desert, about a month's journey from Lassa, in that part of the country inhabited by the wandering Tartars. This communication is accompanied by a drawing, made by the messenger from recollection: it bears some resemblance to a horse, but has cloven hoofs, a long curved horn growing out of the forehead, and a boar-shaped tail, like that of the 'fera monoceros,' described by Pliny.* From their herding together, as the Unicorns of the scripture are said to do, as well as from the rest of the description, it is evident that this singular animal cannot be the rhinoceros, which is a solitary creature; besides that, in the Thibetian manuscript, the rhinoceros is described under the name of Servo, and classed with the elephant. Neither can it be the wild horse, well known in Thibet, for that also has a different name, and is classed in the MS. with the animals which have the hoofs undivided.—I have written (he subjoins) to the Sachia Lama, requesting him to procure me a perfect skin of the animal, with the head, horn, and hoofs; but it will be a long time before I can get it down, for they are not to be met with nearer than a month's journey from Lassa."

We now make a few remarks on SEALS.—First, the COMMON SEAL.

These animals are found on the coasts of the polar regions, both to the north and south, often in extreme abundance, and are generally about five feet in length, closely covered with short hair. They swim with great vigour and rapidity, and subsist on various kinds of fish, which they are often observed to pursue within a short distance of the shore. They possess no inconsiderable sagacity, and may, without much

* In speaking of the wild beasts of India, Pliny says, with regard to the animal in question,—

"Asperrimam autem feram monocerotem, reliquo corpore equo similem, capite cervo, pedibus eliphante, cauda apro, mugitu gravi, uno cornu nigro media fronte, cubitorum duum eminente. Hanc feram vivam negant capi."

Plin. Hist. Mund. Lib. 3, cap. 21.

The resemblance is certainly very striking.

difficulty, if taken young, be familiarized to their keepers, and instructed in various gesticulations. They are supposed to attain great longevity. The female is particularly attentive to her young, and scarcely ever produces more than two at a birth, which, after being suckled a fortnight on the shore, where they are always born, are conducted to the water, and taught by their dam the means of defence and subsistence; and when they are fatigued by their excursions, are relieved by being taken on her back. They distinguish her voice, and attend at her call. The flesh of seals is sometimes eaten, but they are almost always destroyed for their oil and skins. The latter are manufactured into very valuable leather, and the former is serviceable in a vast variety of manufactures. A young seal will supply about eight gallons of oil. The smell of these animals, in any great number upon the shore, is highly disagreeable. In the month of October, they are generally considered as most valuable; and as they abound in extended caverns on the coast, which are washed by the tide, the hunters proceed to these retreats about midnight, advancing with their boat as far into the recess as they are able, armed with spears and bludgeons, and furnished with torches, to enable them to explore the cavern. They begin their operations by making the most violent noises, which soon rouse the seals from their slumbers, and awaken them to a sense of extreme danger, which they express by the most hideous yellings of terror. In their eagerness to escape, they come down from all parts of the cavern, running in a promiscuous and turbulent mass along the avenue to the water. The men engaged in this perilous adventure oppose no impediment to this rushing crowd, but, as this begins to diminish, apply their weapons with great activity and success, destroying vast numbers, and principally the young ones. The blow of the hunter is always levelled at the nose of the seal, where a slight stroke is almost instantly fatal.

This leads us to the consideration of **THE URSINE SEAL**.—This animal grows to the length of eight feet, and to the weight of an hundred pounds. These are found in vast abundance in the islands between America and Kamschatka, from June till September, when they return to the Asiatic or American shores. They are extremely strong, surviving wounds and lacerations which almost instantly destroy life in other animals, for days, and even weeks. They may be observed, not merely by hundreds, but by thousands, on the shore, each male surrounded by his females, from eight to fifty, and his offspring, amounting frequently to more than that number. Each family is preserved separate from every other. The ursine seals are extremely fat and indolent, and remain, with

little exercise, or even motion, for months together, upon the shore. But if jealousy, to which they are ever alive, once strongly operates, they are roused to animation by all the fierceness of resentment and vengeance; and conflicts arising from this cause between individuals, soon spread through families, till at length the whole shore becomes a scene of the most horrid hostility and havoc. When the conflict is finished, the survivors plunge into the water, to wash off the blood, and recover from their exhaustion.

Those which are old, and have lost the solace of connubial life, are reported to be extremely captious, fierce, and malignant; and to live apart from all others, and so tenaciously to be attached to the station which pre-occupancy may be supposed to give each a right to call his own, that any attempt at usurpation is resented as the foulest indignity, and the most furious contests frequently occur in consequence of the several claims for a favourite position. It is stated, that in these combats two never fall upon one. These seals are said, in grief, to shed tears very copiously. The male defends his young with the most intrepid courage and fondness, and will often beat the dam, notwithstanding her most supplicating tones and gestures, under the idea that she has been the cause of the destruction or injury which may have occurred to any of them. The flesh of the old male seal is intolerably strong; that of the female and the young is considered as delicate and nourishing, and compared, in tenderness and flavour, to the flesh of young pigs.

The bottle-nosed seal is found on the Falkland Islands; is twenty feet long; and will produce a butt of oil, and discharge, when struck to the heart, two hogsheds of blood.

We shall close this chapter with an extract from the Public Journals of 1821, on AMERICAN NATURAL HISTORY.

On the unfrequented, solitary, remote banks of the Missouri, grows one of the most ornamental trees that adorn creation—the *Ten-petalled Bartonia*. Its height is four feet; flowers, beautifully white, expand as the sun sets, and close at the approach of morning.—Shall we say that all things were made for the gratification of man only, when he is daily taught that some of the loveliest objects the world contains, he is destined never to behold?—Shall we believe that the sylvan natives are not formed with taste, and enjoy the scenery with which the great Artist has decorated their abode?

A *Leopard* was killed on the 6th day of June, 1820, by John Six, living on the waters of Green river, ten miles south-east of Hartford, in the Ohio county: length from the end of the nose to the buttock, five feet; and a tail two feet long; under

the jaw the colour was black, with white spots equally proportioned; the sides and back are yellow, with black spots, curiously arranged; a row of black spots on its back, much larger than those on its sides, extending half way of the tail; small round ears, black outside, white inside; around its nose and mouth were long stiff bristles; some appeared to grow out black half the length, then white six inches long. The hair on the end of the tail is longer than elsewhere; tail slim; its legs short, and its feet like a cat's, only much larger, with large claws; large teeth; supposed to weigh about one hundred and fifty pounds.

Two-headed Snake.—An extraordinary snake was recently killed in Mason, Massachusetts. It was first discovered basking in the sun, and, after much exertion, although its astonishing agility baffled for a considerable time its pursuers' efforts, it was taken. It measured two feet in length, had two heads, and two legs. The legs were nearly three inches long, were placed about four inches from the heads, and appeared well calculated to assist the animal in running.

A large *Black Snake* was lately killed near Halifax, Nova Scotia, which measured eleven feet nine inches. It was first noticed by a slight crack which it made with its tail, not unlike the cracking of a horse-whip, and appeared to be in great agony; jumping up from the ground, twisting, coiling, &c. After it was killed, this was accounted for satisfactorily. Out of its mouth the tail of another snake was observed to be sticking; on pulling it out, it actually measured five feet three inches. This was the cause of the uneasiness in the living snake; having no doubt been partly strangled by its large mouthful. This great snake was long the terror of the cow-hunters in the neighbourhood of the place where it was killed, and no doubt would have continued so for a long time, had it not been for its voraciousness, which prevented it from running. It was fleetier than any horse, and bade defiance to the puny efforts of man to overtake it.

CHAP. XV.

CURIOSITIES RESPECTING ANIMALS.—(*Concluded.*)

Remarkable Strength of Affection in Animals—Surprising Instances of their Sociality—Unaccountable Faculties possessed by some Animals—Remarkable Instances of Fasting in Animals—Extraordinary Adventures of a Sheep—Sagacity of a Monkey—Astonishing Instance of Sagacity in a Horse—Sagacity of Dogs—Curious Anecdotes of a Dog—Remarkable Dog.

Far as creation's ample range extends,
 The scale of sensual, mental powers, ascends:
 Mark, how it mounts to man's imperial race,
 From the green myriads in the peopled grass!
 What modes of sight, betwixt each wide extreme,
 The mole's dim curtain, and the lynx's beam:
 Of smell, the headlong lioness between,
 And hound sagacious, on the tainted green:
 Of hearing, from the life that fills the flood,
 To that which warbles thro' the vernal wood:
 The spider's touch, how exquisitely fine!
 Feels at each thread, and lives along the line:
 In the nice bee, what sense so subtly true,
 From pois'nous herbs extracts the healing dew:
 How instinct varies in the grovelling swine,
 Compar'd, half-reasoning elephant, with thine!
 Twixt that and reason, what a nice barrier,
 For ever separate, yet for ever near!

Pope.

REMARKABLE STRENGTH OF AFFECTION IN ANIMALS.—
 Mr. White, in his *Natural History*, &c. of Selborne, speaking of the natural affection of brutes, says, "The more I reflect on it, the more I am astonished at its effects. Nor is the violence of this affection more wonderful, than the shortness of its duration. Thus, every hen is in her turn the virago of the yard, in proportion to the helplessness of her brood; and will fly in the face of a dog or sow in defence of those chickens, which, in a few weeks, she will drive before her with relentless cruelty. This affection sublimates the passions, quickens the invention, and sharpens the sagacity, of the brute creation. Thus, a hen, just become a mother, is no longer that placid bird she used to be, but, with feathers standing on end, wings hovering, and clucking note, she runs about like one possessed. Dams will throw themselves in the way of the greatest danger, in order to avert it from their progeny. Thus a partridge will tumble along before a sportsman, in order to draw away the dogs from her helpless covey. In the time of nidification, the most feeble birds will assault the most rapa-

cious. All the hirundines of a village are up in arms at the sight of a hawk, whom they will persecute till he leaves that district. A very exact observer has often remarked, that a pair of ravens, nestling in the rock of Gibraltar, would suffer no vulture or eagle to rest near their station, but would drive them from the hill with amazing fury; even the blue thrush, at the season of breeding, would dart out from the clefts of the rocks, to chase away the kestrel or the sparrow-hawk. If you stand near the nest of a bird that has young, she will not be induced to betray them by an inadvertent fondness, but will wait about at a distance with meat in her mouth for an hour together. The fly-catcher builds every year in the vines that grow on the walls of my house. A pair of these little birds had one year inadvertently placed their nest on a naked bough, perhaps in a shady time, not being aware of the inconvenience that followed; but a hot sunny season coming on before the brood was half fledged, the reflection of the wall became insupportable, and must inevitably have destroyed the tender young, had not affection suggested an expedient, and prompted the parent birds to hover over the nest all the hotter hours, while, with wings expanded and mouths gaping for breath, they screened off the heat from their suffering offspring. A farther instance I once saw of notable sagacity in a willow-wren, which had built in a bank in my fields. This bird, a friend and myself had observed as she sat in her nest; but we were particularly careful not to disturb her, though we saw she eyed us with some degree of jealousy. Some days after, as we passed that way, we were desirous of remarking how this brood went on; but no nest could be found, till I happened to take up a large bundle of long green moss as it were carelessly thrown over the nest, in order to deceive the eye of any impatient intruder."

Next in order is the account of **SURPRISING INSTANCES OF SOCIALITY IN ANIMALS.**—A wonderful spirit of sociality in the brute creation, independent of sexual attachment, has been frequently remarked. Many horses, though quiet with company, will not stay one minute in a field by themselves; the strongest fences cannot restrain them. A horse has been known to leap out of a stable window, through which dung was thrown, after company; and yet in other respects was remarkably quiet. Oxen and cows will not fatten by themselves, but will neglect the finest pasture that is not recommended by society. It would be needless to instance in sheep, which constantly flock together. But this propensity seems not to be confined to animals of the same species. Mr. White mentions a doe that was brought up from a little fawn with a dairy of cows. "With them it goes to the field, and with them it

returns to the yard. The dogs of the house take no notice of this doe, being used to her; but if strange dogs come by, a chase ensues; while the master smiles to see his favourite securely leading her pursuers over hedge, or gate, or stile, till she returns to the cows, who with fierce lowings and menacing horns drive the assailants quite out of the pasture."—Even great disparity of kind and size does not always prevent social advances and mutual fellowship. Of this the following remarkable instance is given by the same author.

"A very intelligent and observant person has assured me, that in the former part of his life, keeping but one horse, he happened also on a time to have but one solitary hen. These two incongruous animals spent much of their time together in a lonely orchard, where they saw no creature but each other. By degrees an apparent regard began to take place between these two sequestered individuals. The fowl would approach the quadruped with notes of complacency, rubbing herself gently against his legs; while the horse would look down with satisfaction, and move with the greatest caution and circumspection, lest he should trample on his diminutive companion. Thus by mutual good offices each seemed to console the vacant hours of the other."

In the Gentleman's Magazine for March, 1788, we have the following anecdotes of a raven, communicated by a correspondent who does not sign his name, but says it is at the service of the doubtful. The raven alluded to lived at the Red Lion at Hungerford; his name was *Ralph*. "You must know then, (says the writer,) that coming into that inn, my chaise ran over or bruised the leg of my Newfoundland dog, and while we were examining the injury done to the dog's foot, Ralph was evidently a concerned spectator; for, the minute the dog was tied up under the manger with my horse, Ralph not only visited him, but fetched him bones, and attended upon him with particular and repeated proofs of kindness. The bird's notice of the dog was so marked, that I observed it to the hostler; for I had not heard a word before of the history of this benevolent creature. John then told me, that he had been bred from his pin-feather in intimacy with a dog; that the affection between them was mutual; and that all the neighbourhood had often been witnesses of the innumerable acts of kindness they had conferred upon each other. Ralph's poor dog, after a while, unfortunately broke his leg; and during the long time he was confined, Ralph waited upon him constantly, carried him provisions daily, and scarcely ever left him alone! One night by accident the hostler had shut the stable-door, and Ralph was deprived of his friend the whole night; but the hostler found in the morning the bottom of the door so pecked away, that had it not been opened, Ralph would



ST. BERNARD DOG.



THE ICELAND DOG.



THE ESQUIMAUX DOG.



BULL DOG

in another hour have made his own entrance-port. I then inquired of my landlady, (a sensible woman,) and heard what I have related confirmed by her, with several other singular traits of the kindnesses this bird shews to all dogs in general, but particularly to maimed or wounded ones. I hope and believe, however, Ralph is still living; and the traveller will find I have not over-rated this wonderful bird's merit."

To these instances of attachment between incongruous animals from a spirit of sociality, or the feelings of sympathy, may be added the following instance of fondness from a different motive, recounted by Mr. White, in the work already so often quoted.

"My friend had a little helpless leveret brought to him, which the servants fed with milk in a spoon; and about the same time his cat kittened, and the young were dispatched and buried. The hare was soon lost, and supposed to be gone the way of most foundlings, or to be killed by some dog or cat. However, in about a fortnight, as the master was sitting in his garden in the dusk of the evening, he observed his cat, with tail erect, trotting towards him, and calling with little short inward notes of complacency, such as they use towards their kittens, and something gambolling after, which proved to be the leveret, which the cat had supported with her milk, and continued to support with great affection. Thus was a graminivorous animal nurtured by a carnivorous and predacious one! Why so cruel and sanguinary a beast as a cat, of the ferocious genus of *Felis*, the *murian leo*, (the lion of the mice,) as Linnæus calls it, should be affected with any tenderness towards an animal which is its natural prey, is not so easy to determine. The strange affection probably was occasioned by that sympathy, and those tender maternal feelings, which the loss of her kittens had awakened in her breast; and by the complacency and ease she derived to herself from the procuring her teats to be drawn, which were too much distended with milk; till from habit she became as much delighted with this foundling, as if it had been her real offspring. This incident is no bad solution of that strange circumstance which grave historians, as well as poets, assert, of exposed children being sometimes nurtured by female wild beasts, that probably had lost their young; for it is not one whit more marvellous that Romulus and Remus, in their infant state, should be nursed by a she-wolf, than that a poor little suckling leveret should be fostered and cherished by a bloody grimalkin."

We shall now give the history of the UNACCOUNTABLE FACULTIES POSSESSED BY SOME ANIMALS.—Besides reflection and sagacity, often in an astonishing degree, and besides

the sentiments and actions prompted by social or natural attachments, brutes seem on many occasions inspired with a superior faculty, a kind of presentiment or second sight, as it were, with regard to events and designs altogether unforeseen by the rational beings whom they concern. The following account is of unquestionable authenticity.

At the seat of the late Earl of Litchfield, three miles from Blenheim, there is a portrait in the dining-room of Sir Henry Lee, by Johnston, with that of a mastiff dog which saved his life. A servant had formed the design of assassinating his master, and robbing the house; but the night he had fixed on, the dog, which had never been much noticed by Sir Henry, for the first time followed him up stairs, got under his bed, and could not be got from thence by either master or man: in the dead of night, the same servant entered the room to execute his horrid design, but was instantly seized by the dog, and, being secured, confessed his intentions. Upon what hypothesis can we account for a degree of foresight and penetration such as this? Will it be suggested, as a solution of the difficulty, that a dog may possibly become capable in a great measure of understanding human discourse, and of reasoning and acting accordingly; and that, in the present instance, the villain had either uttered his design in soliloquy, or imparted it to an accomplice, in the hearing of the animal?

It has been disputed whether the brutes have any language whereby they can express their minds to each other; or whether all the noise they make consists only of cries, inarticulate and unintelligible even to themselves. Father Bougeant gives the following instance, among others, to prove that brutes are capable of forming designs, and of communicating those designs to others.—A sparrow, finding a nest that a martin had just built, standing very conveniently for him, possessed himself of it. The martin, seeing the usurper in her house, called for help to expel him. A thousand martins came full speed, and attacked the sparrow; but the latter being covered on every side, and presenting only his large beak at the entrance of the nest, was invulnerable, and made the boldest of them who durst approach him repent of their temerity. After a quarter of an hour's combat, all the martins disappeared: the sparrow thought he had got the better, and the spectators judged that the martins had abandoned the undertaking. Not in the least; immediately they returned to the charge, and each of them having procured a little of that tempered earth with which they make their nests, they all at once fell upon the sparrow, and enclosed him in the nest, to perish there, though they could not drive him thence.—Can it be imagined that the martins could have been able to hatch and concert this

design all of them together, without speaking to each other, or without some medium of communication equivalent to language?

Remarkable Instances of FASTING IN ANIMALS.—The following remarkable instances of brutes being able to live long without food, are related by Sir William Hamilton, in his account of the earthquakes in Italy, (*Phil. Trans.* vol. 73.) “At Soriano, two fattened hogs, that had remained buried under a heap of ruins, were taken out alive the 42d day; they were lean and weak, but soon recovered.—At Messina, two mules belonging to the Duke de Belviso, remained under a heap of ruins, one of them 22 days, and the other 23: they would not eat for some days, but drank water plentifully, and are now recovered.—There are numberless instances of dogs remaining many days in the same situation; and a hen belonging to the British vice-consul at Messina, that had been closely shut up under the ruins of his house, was taken out the 22d day, and is now recovered: it did not eat for some days, but drank freely; it was emaciated, and shewed little signs of life at first. From these instances, and several others of the same kind that have been related to me, but which, being less remarkable, I omit, one may conclude, that long fasting is always attended with great thirst and total loss of appetite.”

An instance not less remarkable than any of these, we find in the *Gent. Mag.* for Jan. 1785. “During the heavy snow which fell in the night of the 7th of January, 1776, a parcel of sheep belonging to Mr. John Wolley, of Matlock, in Derbyshire, which were pastured on that part of the East Moor that lies within the manor of Matlock, were covered with the drifted snow. In the course of a day or two all the sheep that were covered with the snow were found again, except two, which were consequently given up as lost, but on the 14th of Feb. following (some time after the break of the snow in the valleys, and 38 days after the fall) as a servant was walking over a large parcel of drifted snow, which remained on the declivity of a hill, a dog he had with him discovered one of the two sheep that had been lost, by winding (or scenting) it, through a small aperture which the breath of the sheep had made in the snow. The servant thereupon dug away the snow, and released the captive from its prison; it immediately ran to a neighbouring spring, at which it drank for a considerable time; and afterwards rejoined its old companions, as though no such accident had befallen it. On inspecting the place where it was found, it appeared to have stood between two stones which lay parallel with each other, at about two feet and a half distance, and probably were the

means of protecting it from the great weight of the snow, which in that place lay several yards thick : from the number of stones around it, it did not appear that the sheep had been able to pick up any food during its confinement. Soon afterwards its owner removed it to some low lands ; but as it had nearly lost its appetite, it was fed with bread and milk for some time : in about a fortnight after its enlargement, it lost its sight and wool ; but in a few weeks afterwards they both returned again, and in the course of the following summer it was quite recovered. The remaining sheep was found dead, about a week after the discovery of the other."

The following authentic history of the **EXTRAORDINARY ADVENTURES OF A SHEEP**, which was transmitted to a respectable periodical journal, from Salisbury, where the animal died, will, we doubt not, prove interesting to our readers, as it affords an instance of animal sagacity, in that species on which Nature has bestowed it with a sparing hand.

She was born in the North Highlands of Scotland ; embarked, in 1804, in the Arab, and visited Iceland, Greenland, and Norway : here she was sent on shore to graze ; the next day, seeing the boat row past the place where she was feeding, she leaped into the water, and swam to the boat : this circumstance protected her ever after from the butcher, and her life was one scene of gratitude. She was in fourteen different actions with the enemy's flotilla and batteries off Boulogne, in the last of which she lost part of one of her horns. After that she traversed the whole of the western extent of Africa, across the equator to the Brazils, and along the Guiana coast of South America to the West Indies ; from thence to Ireland, and then home. She was so tame as to feed from the hand, and, like the dog, followed her protector ; would dance for a cabbage leaf ; preferred the house and fire-side to the stable ; for several months was never known to touch hay or grass, living with the sailors on pudding and grog, and nibbling the ends of rope or canvass. The paring of an apple or a potato was her highest luxury. The docility of the animal was highly amusing : putting her head under your arm, she would eat off your plate at dinner ; would drink wine or spirits, and tea, if well sweetened ; run up and down the stairs ; and, if she got into the kitchen, would take the cover from the pot, and peep into it. Her wool was of a soft and silky nature.

After having weathered so many storms and hardships, she was brought as a present by Lieut. Bagnold, of the royal navy, to a lady in Salisbury ; where, alas ! their fleecy friend died of a bowel complaint the second day after her arrival, most sincerely lamented, the 22d of January, 1808.

Lines written on the preceding most remarkable Sheep.

Scarce thirty suns had brighten'd o'er her head,
 When to Arab's deck young Jack* was led;
 Here from her master's side she ne'er would stray,
 Ate of his meat, and on his hammock lay.
 Grateful for this, when left on Norway's beach,
 She brav'd the sea, the distant ship to reach.
 This act heroic stays the murd'rous knife,
 And all the crew demand to save her life.
 Thus spar'd, she visits each far distant main :
 In fourteen battles, amid heroes slain,
 She 'scapes unhurt; save that the whizzing lead
 Bears off one horn, then gently graz'd her head.
 All perils past, she reach'd her native shore,
 To tempt the rage of war and seas no more.—
 "Go, my dear Jack," her grateful master said,
 (As on her snow-white head his hand he laid ;)
 "Go seek the shady grove, the verdant mead ;
 There rest securely, and securely feed.
 A thousand joys shall thy long life attend,
 Blest with that greatest good, a faithful friend.—
 Vain were these hopes ! at Sarum safe arriv'd,
 Sudden she sicken'd, and as sudden died.—
 Well, then, dear Jack, 'since fate has seal'd thy doom,
 Be thine the honours of the sculptur'd tomb.
 There too shall this just eulogy appear,
 "A sheep, a much-lov'd sheep, reposes here."
 Muses in thee some future bard shall trace,
 Such as ne'er yet adorn'd the fleecy race.
 A patient temper, to all ills resign'd,
 Sense almost human, to good nature join'd,
 No charms for her had flow'ry lawn or grove,
 'Twas man she sought—to man gave all her love.
 Had she but liv'd in fiction's classic days,
 The muse had sung her fame in deathless lays ;
 Had fondly told, that her not mortal frame
 Return'd from earth to heav'n, from whence it came ;
 Advanc'd to share with Aries on high,
 The space assign'd him in her native sky.

* It was a female sheep, but by the sailors was constantly called Jack.

The following is a notable instance of the SAGACITY OF A MONKEY.—Some strolling showmen, being at Stonin, a town of Lithuania, belonging to Count Ogienski, grand general of that province, diverted the inhabitants by exhibiting the tricks and gambols of half a dozen monkeys they had along with them : this new spectacle roused the curiosity of people of all degrees, insomuch that the overseers of the improvements which were carrying on in that neighbourhood saw themselves deserted by all their workmen. Desirous to recall them to their duty, yet unwilling to drive the strollers away by main force, they offered the chief a round sum of money, on condition of his leaving the town immediately : the man agreed to this ; and, with his two assistants, and company of four-footed comedians, set off from Stonin.

They had hardly proceeded out of town, when they were beset by some banditti, who robbed and murdered not only them, but all their harmless followers, except one, who escaped the general slaughter, and, unperceived, climbed up a tree, whence he could spy all the proceedings of the villains, who had no sooner made sure of their spoils, than they proceeded to inter the bodies, both of the men and beasts, covering the place with earth and boughs, and then made off.

Some time after, a coach-and-four approached; which the surviving monkey no sooner descried, than he set up a most dismal yell. The gentleman, who, as it afterwards proved, was going on a visit to the grand-general, amazed at so unusual a noise, ordered the coachman to stop, when, alighting, he was still more surprised to see the animal coming down the tree, and making towards him; the monkey, taught perhaps to reverence people of rank, began to lick his feet, and, by several gestures, seemed to intimate that he had something extraordinary to discover; the animal led the way, and the gentleman followed with his servant. As soon as they came to the place, the monkey rent the air with the most piteous accents; then taking up some of the branches, he began to scratch the earth, and throw it up with all his might: the gentleman seeing this, ordered his man to fall to work, and in a few minutes the whole scene of horror opened to his view.

Fearing a similar fate, the Lithuanian, forgetting the sagacious animal, got into his carriage, and posted to the grand-general as fast as his horses could carry him. Poor pug, rather than be left behind, fastened about the coach as well as he could, and arrived likewise at the count's, who, having heard the gentleman's report, sent a proper force after the banditti: they were overtaken, and committed to prison. The grand-general ordered the monkey to be taken into his palace, and kept with the greatest care. This surprising mark of instinct and gratitude is deemed the more wonderful, as that animal generally turns his natural sagacity to mischief and treachery.

We shall in the next place give an astonishing instance of SAGACITY IN A HORSE.

At Chepstow, in Monmouthshire, there is a bridge, the construction of which is extremely curious, as the planks that form the floor rise with the tide, which, at certain times, is said to attain to the height of seventy feet.

This floor of the bridge it was necessary at one time to remove; which was accordingly done, and only one or two of the planks remained for the convenience of the foot passengers. This way was well lighted, and a man placed at the

end to warn those that approached of their danger. But it so happened, that one dreadful stormy night the lamps blew out, and the monitor, supposing that no one would in such a hurricane attempt to pass, wisely retired to shelter.

After midnight, a traveller knocked at the door of an inn at Chepstow.

"Who is there?" said the landlord, who had long retired to rest, and was now called out of bed.

The traveller mentioned his name, which was well known.

"How did you come?" said the landlord.

"How did I come? Why, over the bridge to be sure!"

"What! on horseback?"

"Yes."

"No!" said the landlord, "that is impossible! however, as you are here, I'll let you in."

The host, when the traveller repeated his assertion, was staggered. He was certain that he must have come over the bridge, because there was no other way; but also knowing the state in which the passage was, he could only attribute the escape of the traveller and his horse to witchcraft. He, however, said nothing to him that night; but the next morning took him to the bridge, and showed him the plank that his horse must have passed over, at the same time that he pointed to the raging torrent beneath.

Struck with this circumstance, the traveller, it is said, was seized with an illness from which he did not speedily recover.

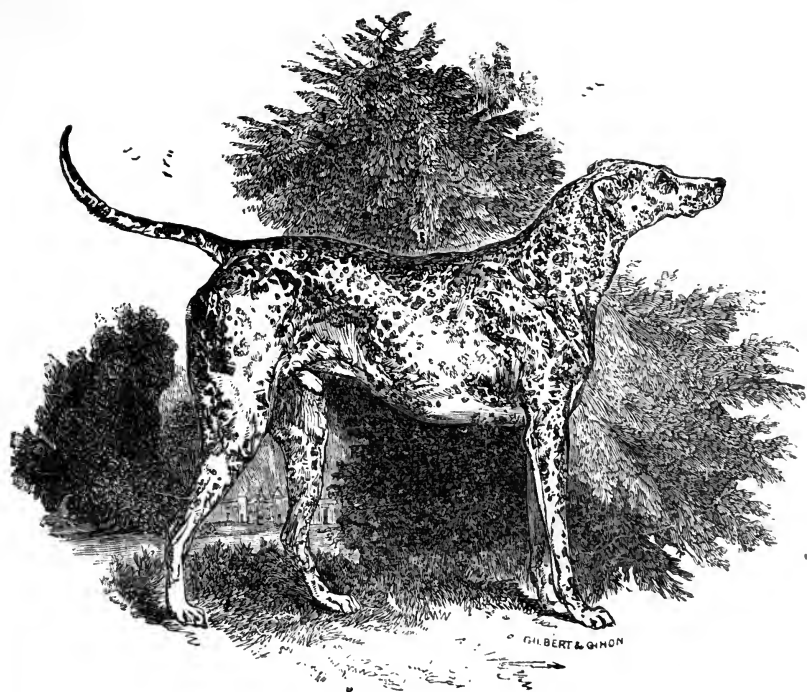
It is from a respectable source that we insert the following narrative of the SAGACITY OF DOGS.

M. La Valee, in his *Journey through the Departments of France*, published in 1792, gives the following curious account of the manner in which the country people, in the neighbourhood of Peronne and Doulens, had trained their dogs to elude the vigilance of the officers of the revenue.—At night, these animals were laden, each with a parcel of goods proportioned to its size; except one alone, who was their leader, and went without any burden. A crack of a whip was a signal for them to set out. The leader travelled a little distance before the rest; and, if he perceived the traces of any stranger, he returned to the other dogs: these either took a different way, or, if the danger was pressing, concealed themselves behind the hedges, and lay close till the patrol had passed. When they arrived at the habitation of their master's associate, they hid themselves in the neighbouring fields and hedges, while their leader went to the house, and scratched at the door, or barked, till he was admitted, when he lay quietly down, as at home: by this the smuggler knew that the caravan was come; and, if the coast was clear, he went out, when

he gave a loud whistle, and the dogs came running to him from their several hiding-places!

Peltier, in his *Annals of Paris*, No. 164, for December, 1798, records the following anecdote:—At the beginning of the Revolution, a dog went daily to the parade before the palace of the Thuilleries, thrust himself between the legs of the musicians, marched with them, halted with them, and after the parade, disappeared until the next morning, when he resumed his occupation. The constant appearance of this dog, and the pleasure which he seemed to take in the music, made him a favourite with the band, who nicknamed him, *Parade*. One gave him food to-day, another to-morrow; and he understood, by a slight signal, and a word or two, whom he was to follow for his dinner; after which, faithful to his independence, the dog always withdrew, in spite of any caresses or threats. Sometimes he went to the opera, sometimes to the *Comedie Italienne*, and sometimes to the *Theatre Feydeau*; in each of which houses he found his way to the orchestra, and would lie down silently in one corner of it, until the performance was over. “I know not, (says Peltier) whether this dog be now alive; but I know many musicians, to whom his name, his figure, and the singularity of his habits, are perfectly familiar.”

In *Petit's Campaign of Italy*, under the chief consul Buonaparte, published in 1800, we have the following anecdote, which places this animal in the most engaging light: “In traversing the Alps over the mountain Great St. Bernard, many people perish among the almost inaccessible rocks, whose summits are covered with eternal snow. At the time we crossed them, the chapel of the monastery of St. Bernard was filled with dead bodies, which their dogs had discovered suffocated and benumbed under the snow. With what emotions of pleasure did I caress these dogs, so useful to travellers! how can one speak of them without being moved by their charitable instinct! Notwithstanding the paucity of our eatables, there was not a French soldier who did not manifest an eagerness to give them some biscuit, some bread, and even a share of their meat. Morning and evening, these dogs go out on discovery; and if in the midst of their wandering courses the echo of some unfortunate creature ready to perish reaches their attentive ears, they run towards those who call out, express their joy, and seem to bid the sufferer take courage, till they have been to procure assistance; in fact, they hasten back to the convent, and, with an air of inquietude and sadness, announce in a very discernible manner what they have seen. In that case, a small basket is fastened round the dog's neck, filled with food proper for re-animating life almost exhausted; and, by following the benevolent mes-



THE DANISH DOG.



FOX HOUND.



MAUDRILL.



PINCH.



MACAQUE.



WANDEROO.



MONA.

senger, an unhappy creature is thus frequently snatched from impending destruction."

A Florentine nobleman possessed a dog, which would attend his table, change his plates, and carry his wine to him, with the utmost steadiness, and the most accurate attention to his master's notices.

It is related by the illustrious Leibnitz, that a Saxon peasant was in possession of a dog of the middling size, then about three years of age. The peasant's son, perceiving accidentally, as he imagined, some resemblance in its sounds to those of the human voice, attempted to teach it to speak. By the perseverance of the lad, the dog acquired the power, we are told, of pronouncing about thirty words. It would, however, exercise this extraordinary faculty only with reluctance, the words being always first spoken by the preceptor, and then echoed by the pupil. This circumstance is attested by Leibnitz, who himself heard it speak; and it was communicated by him in a memoir to the Royal Academy of France.

In the theatre of Marcellus, a case occurred, which many will consider more probable, but which is almost as extraordinary, as mentioned by Plutarch.—"A dog was here exhibited which excelled in various dances of great complication and difficulty, and represented also the effects of disease and pain upon the frame, in all the contortions of countenance and writhings of the body, from the first access, to that paroxysm which often immediately precedes dissolution. Having thus apparently expired in agony, he would suffer himself to be carried about motionless, as in a state of death; and after a sufficient continuance of the jest, he would burst upon the spectators with an animation and sportiveness, which formed a very interesting conclusion of this curious interlude, by which the animal seemed to enjoy the success of his scenic efforts, and to be delighted with the admiration which was liberally and universally bestowed upon him."

"A tinker (says Pezelius) brought a wonderful dog to Constantinople; and a number of people being assembled to behold him, many of them laid their rings in a heap confusedly before him. At the command of his master, he would restore to every man his own, without any mistake. Also, when his master asked him which of the company was a captain, which a poor man, which a wife, which a widow, and the like, he would discover all this without error, by taking the garment of the party inquired after in his mouth."

CHAP. XVI.

CURIOSITIES RESPECTING FISHES.

The Frog-fish—Bird-catching Fish—The Nautilus—The Air-bladder in Fishes—Respiration in Fishes—Shower of Fishes.

“—————The scaly brood.

In countless myriads cleave the crystal flood.”

“Who can old Ocean’s pathless bed explore,

And count her tribes that people ev’ry shore.”

THE FROG-FISH.—There is a very singular animal of Surinam, bearing this name, of which a figure is given by Mr. Edwards, in his History of Birds, vol. 1. but of which no specimen is to be found either in the British Museum, or in any private collection, except that of Dr. Fothergill. It was brought from Surinam, in South America.

Frogs, both in Asia and Africa, according to Merian, change gradually from fishes to frogs, as those in Europe; but after many years, revert again into fishes, though the manner of their change has never been investigated. In Surinam these fishes are called *Jakjes*: they are cartilaginous, of a substance like our mustela, and exquisite food; they are formed with regular vertebræ, and small bones all over the body, divided into equal parts; are first darkish, and then gray; and their scales make a beautiful appearance. Whether this animal is, in its perfect state, a species of frog with a tail, or a kind of water-lizard, Mr. Edwards does not pretend to determine; but he observes, that when its size is considered, if it should be deemed a tadpole, at first produced from spawn, and in its progress towards a frog, such an animal, when full-grown; if it bears the same proportion to its tadpole state that those in Europe do to theirs, it must be of enormous size; for our full-grown frogs exceed the tadpoles at least fifty times.

Another curiosity is, **THE BIRD-CATCHING FISH.**—This fish is called by the natives of Canada, *Chaousaron*; its body is nearly the shape of a jack or pike, but is covered with scales that are proof against the stab of a dagger; its colour is a silver gray, and there grows under its mouth a fin that is flat, jagged at the edges, and pierced at the end, which gives reason to conjecture that it breathes by that part. This fish is about five feet in length, and as thick as a man’s thigh; but some of them, it is said, are eight or ten feet long. In order to catch birds, it hides itself among the reeds in such a manner, that no part of it can be seen but the fin just mentioned; this

it erects upright out of the water, and birds that want to rest themselves, take this fin for a reed, or a dry piece of wood; but no sooner have they alighted on it, than the fish opens his mouth, and makes such a quick motion to seize its prey, that it seldom escapes.

Another curious object is, THE NAUTILUS.

Learn of the little Nautilus to sail,
Spread the thin oar, and catch the driving gale. Pope.

The shell of this animal consists of one spiral valve, divided into several apartments. There are seventeen species, chiefly distinguished by peculiarities in their shells.

The most remarkable division of the Nautilus is into the thin and thick-shelled kinds. The first is called *Nautilus Papyraceus*; and its shell is indeed no thicker than a piece of paper, when out of the water. This species is not at all fastened to its shell; but there is an opinion, as old as the days of Pliny, that this creature creeps out of its shell, and goes on shore to feed. When this species is to sail, it expands two of its arms on high, and between these supports a membrane, which it throws out on this occasion: this serves for its sail, and the two other arms it hangs out of its shell, to serve occasionally either as oars or as a steerage; but this last office is generally served by the tail. When the sea is calm, numbers of these creatures may frequently be seen diverting themselves in this manner, in the Mediterranean: but as soon as a storm rises, or any thing gives them disturbance, they draw in their legs, and take in as much water as makes them specifically heavier than that in which they float; and then they sink to the bottom. When they rise again, they void this water by a number of holes, of which their legs are full.

The other nautilus, whose shell is thick, never quits its habitation. This shell is divided into forty or more partitions, which grow smaller and smaller as they approach the extremity or centre of the shell: between each of these cells there is a communication by means of a hole in the centre of the partitions. Through this hole there runs a pipe, of the whole length of the shell. It is supposed by many, that by means of this pipe the fish occasionally passes from one cell to another; but this seems by no means probable, as the fish must undoubtedly be crushed to death by attempting to pass through it. It is much more likely that the fish always occupies the largest chamber in its shell; that is, that it lives in the cavity between the mouth and the first partition, and that it never removes out of this; but that all the apparatus of sails, and a pipe of communication, which we so much admire, serve

only to admit occasionally air or water into the shell, in such proportion as may serve the creature in its intentions of swimming.

Some authors call this shell the *concha margaritifera*: but this can be only on account of the fine colour on its inside, which is more beautiful than any other mother-of-pearl; for it has not been observed than this species of fish ever produced pearls.

It must be observed, that the polypus is by no means to be confounded with the paper-shelled nautilus, notwithstanding the great resemblance in the arms and body of the inclosed fish; nor is the cornu ammonis, so frequently found fossil, to be confounded with the thick-shelled nautilus, though the concamerations and general structure of the shell are alike in both: for there are great and essential differences between all these genera. There is a pretty copious and minute account of this curious animal in the Gentleman's Magazine, vol. xxii. p. 6, 7, 8, and 301, and vol. xxv. p. 128.

We now proceed to describe that destructive inhabitant of the mighty deep, THE SHARK.—Sharks, though voracious creatures, are seldom destructive in the temperate regions; it is in the torrid zone that their ravages are most frequent. In the West Indies, accidents happen from them daily. During the American war in 1780, while the Pallas frigate was lying in Kingston harbour, a young North American jumped overboard one evening, to make his escape, and perished by a shark in a shocking manner. He had been captured in a small vessel, lost all his property, and was detained by compulsion in the English navy, to serve in a predatory war against his country. But he, animated with that spirit which pervaded every bosom in America, resolved, as soon as he arrived at some port, to release himself from the mortifying state of employing his life against his country, which, as he said when dying, he was happy to lay down, as he could not employ it against her enemies. He plunged into the water: the Pallas was a quarter of a mile from the shore. A shark perceived him, and followed him very quietly; till he came near the shore; where, as he was hanging by a rope that moored a vessel to a wharf, scarcely out of his depth, the shark seized his right leg, stripped the flesh entirely from the bone, and took the foot off at the ancle. He still kept his hold, and called to the people in the vessel near him, who were standing on the deck, and saw the affair. The shark then seized his other leg, which the man by his struggling disengaged from his teeth, but with the flesh cut through down to the bone, into a multitude of narrow slips. The people in the vessel threw billets of wood into the water, and

frightened the shark away. The young man was brought on shore. Dr. Mosely was called to him; but he had lost so much blood before any assistance could be given him, that he expired before the mangled limbs could be taken off. A few weeks before this, a shark of twelve feet in length was caught in the harbour; and on being opened, the entire head of a man was found in his stomach. The scale and flesh of the face were macerated to a soft pulpy substance; which, on being touched, separated entirely from the bones. The bones were somewhat softened, and the sutures loosened.—(Moseley on Tropical Diseases.)

A very extraordinary instance of intrepidity and friendship is given by M. Hughes, in his *Natural History of Barbadoes*. It happened about the end of Queen Anne's wars, at Barbadoes.—The sailors of the *York Merchant*, having ventured into the sea to wash themselves, a large shark made towards them; upon which they swam back, and all reached the boat except one, whom the monster overtook, and, gripping him by the small of his back, soon cut him asunder, and swallowed the lower part of his body; the remaining part was taken up and carried on board, where was a comrade of the deceased, between whom friendship had been long reciprocal. When he saw the severed trunk of his friend, with a horror and emotion too great for words to paint, he vowed that he would make the devourer disgorge, or be swallowed himself in the same grave, and plunged into the deep, armed with a sharp-pointed knife. The shark no sooner saw him, than he made furiously toward him: both were equally eager, the one of his prey, the other of revenge. The moment the shark opened his rapacious jaws, his adversary dexterously diving, and grasping him with his left hand somewhat below the upper fins, successfully employed his knife in his right hand, giving him repeated stabs in the belly. The enraged shark, after many unavailing efforts, finding himself overmatched in his own element, endeavoured to disengage himself, sometimes plunging to the bottom, then, mad with pain, rearing his uncouth form, now stained with his own streaming blood, above the foaming waves. The crews of the surrounding vessels saw the doubtful combat, uncertain from which of the combatants the streams of blood issued; till at length the shark, much weakened by the loss of blood, made towards the shore, and with him his conqueror; who, now assured of victory, pushed his foe with redoubled ardour, and, by the help of an ebbing tide, dragged him on shore, ripped up his bowels, and united and buried the severed carcase of his friend.

“It is evident, (says Dr. Moseley,) that digestion in these animals is not performed by trituration, nor by the muscular action of the stomach; though nature has furnished them

with a stomach of wonderful force and thickness, and far exceeding that of any other creature. Whatever their force of digestion is, it has no effect upon their young ones, which always retreat into their stomachs in time of danger. That digestion is not performed by heat in fish, is equally evident. The coolness of the stomach of these fishes is far greater than the temperature of the water out of which they are taken; or of any other part of the fish, or of any other substance of animated nature I ever felt. On wrapping one of them round my hand, immediately on being taken out of the fish, it caused so much aching and numbness that I could not endure it long. Of these voracious sea monsters, there are thirty three species."

THE TORPEDO.—The torpedo inhabits the Mediterranean and the North Seas, and grows to the weight of twenty pounds. This fish possesses a strong electrical power, and is capable of giving a very considerable shock through a number of persons forming a communication with it. This power was known to the ancients, but exaggerated by them with all the fables natural to ignorance; and it is only recently that the power has been ascertained to be truly electric. It is conducted by the same substances as electricity, and intercepted by the same. In a minute and a half, no fewer than fifty shocks have been received from this animal, when insulated. The shocks delivered by it in air, are nearly four times as strong as those received from it in water. This power appears to be always voluntarily exercised by the torpedo, which occasionally may be touched and handled without its causing the slightest agitation. When the fish is irritated, however this quality is exercised with proportional effect to the degree of irritation; and its exercise is stated, in every instance, to be accompanied by a depression of the eyes. When that animal exerts the benumbing power, from which it derives its name, and when it operates by separate and repeated efforts, this is always the case. Both in the continued, and in the instantaneous process, the eyes, which are at other times prominent, are withdrawn into their sockets; a circumstance very naturally attaching both to the condensation and discharge of the subtle fluid. Specimens have been known of this fish weighing fifty, and even eighty pounds. It commonly lies in forty fathoms of water, and is supposed to stupify its prey by this extraordinary faculty. It is sometimes nearly imbedded in the sands of shallows; and it is stated, in these cases, to give to any who happens to tread upon it, an astonishing and overwhelming shock. On dissection, it was found to exhibit no material difference from the general structure of the ray, excepting with respect to the electric or galvanic organs,

which have been minutely examined and detailed by the celebrated anatomist, John Hunter: he states them "to be placed on each side of the cranium and gills, reaching thence to each great fin, and extending longitudinally from the anterior extremity of the animal, to the transverse cartilage which divides the thorax from the abdomen."

From the whole description, it appears that these organs, as Mr. Shaw observes, constitute a pair of galvanic batteries, disposed in the form of perpendicular hexagonal columns; while, in the *gymnotus electricus*, the galvanic battery is disposed lengthwise on the lower part of the animal. It is stated, that the torpedo, in its dying state, communicates shocks in more than usually rapid succession, but in proportional weakness; and in seven minutes, in these circumstances, three hundred and sixty small shocks were distinctly felt. On the same authority (that of Spallanzani) it is reported, that the young torpedo can exercise this power at the moment after its birth, and even possesses it while a fœtus, several of these having been taken from the parent fish, and being found to communicate perceivable shocks, which, however, were most distinctly felt when these animals were insulated on a plate of glass.

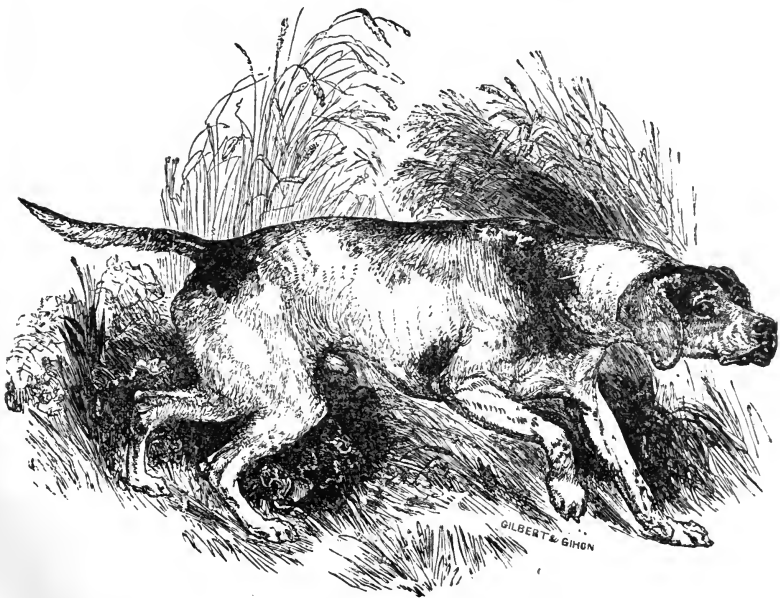
A very curious object is, **THE AIR-BLADDER IN FISHES.**—There is no doubt that fishes extract air from water by means of their gills, since it is through them that they renew the air of their air-bladder. This bladder is an oblong bag, consisting of two or three membranes easily separated; sometimes it has only a single lobe or cavity, as in the case of pikes, whittings, trouts, &c.; at other times it has two lobes, as in the case of barbel and carp; three, as in that of the sea tench; or four, as in the Chinese gold fish. It is by expanding or compressing this bladder, that the fish occupies more or less space in the water, becomes more or less heavy, and ascends or descends as it chooses. The division of the bladder into different lobes has proceeded from a very sufficient reason. When the bladder has only one cavity, as in the case of fishes of prey, the motion of ascent or descent takes place slowly, and without a break; because, as they compress the whole bladder at once, the whole body is moved horizontally, upwards or downwards, as the case may be; a circumstance which has the effect of lessening, in consequence of the resistance of the water, the swiftness of those tyrants of the deep. When the bladder has two lobes, as in the case of the carp, which lives on insects, that fish, by expanding the anterior and compressing the posterior lobe, rises rapidly with the head foremost to the surface of the water, or sinks to the bottom with equal expedition, by compressing its two lobes in different ways. The consequence is,

an increased promptitude of movement, and additional means of escaping from its enemies. When the bladder has four lobes, as in the case of the gold fish, that fish is thus enabled to vary greatly its contractions and expansions. It rises, sinks, bends, erects, or turns itself in a thousand ways, and plays in the water, like a bird in the air. It displays all the richness of the colours of gold, silver, or purple, with which Nature has adorned it. Its attitudes are so graceful, and its movements so varied, that the Chinese, from whom we originally received it, are said to pass whole days in looking at it, in the basins of the fountains in their gardens, or in crystal vessels. It is evidently indebted for the ease and grace of its motions, to the modulations consequent on the four divisions of its air-bladder.

Another subject of curiosity is, **THE RESPIRATION IN FISHES.**—Fish derive air from the water which they are incessantly swallowing through the mouth, and throwing out by the gills. The gills are formed with infinite skill, and may be called a delicate kind of sieve, adapted for separating air from water. Their operation proves the radical difference between these two elements, and leads to the conclusion, that they are not joined even when mixed. The gills are placed in the back part of the sides of the head, and are contained in a cavity adapted for them. They are a kind of red and flexible leaflets, consisting of a row of thin plates, like the blade of a knife, pressed against each other, and forming a succession of barbs or fringed substances, similar to those on the side of a goose-quill. These gills are covered with a small lid, and with a membrane, supported by cartilaginous threads. Both are capable of being raised and lowered; and, by being thus opened, they afford a passage to the water swallowed by the animal. A prodigious number of muscles give motion to these minute particles. It may appear almost incredible, that the number of particles connected with the respiration of the carp is not fewer than 4386. Of these, sixty-nine are muscles; while the arteries of the gills, in addition to eight principal branches, throw forth 4320 smaller ramifications, while each of the latter gives birth to a number of cross arteries. Add to this, that the quantity of nerves is not smaller than that of the arteries; and that the veins are divided and subdivided, like the arteries, inasmuch as they do not give rise to any transverse capillary vessels. In this manner the blood flowing from the heart of the fish is spread over all the plates or blades of which the gills are composed; so that a very small quantity of blood is exposed to the action of the water, for the purpose, no doubt, that each part may be easily penetrated by the particles of air detached from the water.



PERSIAN GREYHOUND.



POINTER.



ANIMAL SAGACITY

It is not easy to explain in what manner these particles are detached from the water by the operation of the gills; but there seems no doubt of the fact, nor of the redness of the gills being a consequence of the operation of the air. That redness is exactly similar to the vermilion of the blood in the veins of animals with lungs, a vermilion considerably brighter than that of the arteries.

We shall conclude this chapter with an account of a **SHOWER OF FISHES**.—In the Philosophical Transactions for 1698, Mr. Robert Conny gives the following account of a phenomenon of this kind.

On Wednesday before Easter, anno 1666, a pasture field at Cranstead, near Wrotham, in Kent, about two acres, which is far from any part of the sea, or branch of it, and a place where there are no fish-ponds, but a scarcity of water, was all overspread with little fishes, conceived to be rained down, there having been at that time a great tempest of thunder and rain: the fishes were about the length of a man's little finger, and judged by all who saw them to be young whittings. Many of them were taken up, and shewed to several persons. The field belonged to one Ware, a yeoman, who was at that Easter sessions one of the grand inquest, and who carried some of the fish to the sessions of Maidstone, in Kent, and shewed them, among others, to Mr. Lake, a benchet of the Middle Temple, who procured one of them, and brought it to London. The truth of it was averred by many that saw the fishes lie scattered all over the field. There were none in the other fields adjoining: the quantity of them was estimated to be about a bushel.

It is probable that these fishes were absorbed from the surface of the water by the electric power of a water-spout; or brushed off by the violence of a hurricane. The phenomenon, though surprising, has occurred in various countries, and occasionally in situations far more remote from the coast than that before us.

CHAP. XVII.

CURIOSITIES RESPECTING FISHES.—(*Concluded.*)*The Whale—Whale Fishery—The Kraken.*

“————— The whales

Toss in foam their lashing tails.

Wallowing unwieldy, enormous in their gait,

hey seem a moving land, and at their gills

Draw in, and at their trunk spout out, a sea.’

THE following account of the great Northern, or GREENLAND WHALE, was first published by Mr. W. Scoresby, jun. M. W. S. in the Memoirs of the Wernerian Society, vol. I.

“The whale, when fullgrown, is from 50 to 65 feet in length, and from 30 to 40 in circumference, immediately before the fins. It is thickest a little behind the fins, and from thence gradually tapers towards the tail, and slightly towards the neck. It is cylindrical from the neck until near the junction of the tail and body, where it becomes rigid.

“The head has a triangular shape. The bones of the head are very porous, and full of a fine kind of oil. When the oil is drained out, the bone is so light as to swim in water. The jaw-bones, the most striking portions of the head, are from 20 to 25 feet in length, are curved, and the space between them is 9 or 10 feet, by 18 or 20. They give shape to the under part of the head, which is almost perfectly flat, and is about 20 feet in length by 12 in breadth. The tongue is of great size, and yields a ton or more of oil. The lips, which are at right angles to the flat part of the base of the head, are firm and hard, and yield about two tons of oil.

“To the upper jaw is attached the substance called whalebone, which is straight in some individuals, and in others convex. The laminae, or blades, are not all of equal length: neither are the largest exactly in the middle of the series, but somewhat nearer the throat; from this point they become gradually shorter each way. In each side of the mouth are about 200 laminae of whalebone. They are not perfectly flat; for besides the longitudinal curvature already mentioned, they are curved transversely. The largest laminae are from ten to fourteen feet, very rarely fifteen feet, in length. The breadth of the largest, at the thick ends, or where they are attached to the jaw, is about a foot. The Greenland fishers estimate the size of the whale by the length of the whalebone: where the whalebone is six feet long, then the whale is said to be a size-fish. In suckers, or young whales still under the protection of the mo-

ther, the whalebone is only a few inches long. The whalebone is immediately covered by the two under lips, the edges of which, when the mouth is shut, overlap the upper part in a squamous manner.

"On the upper part of the head there is a double opening, called the spout-holes, or blow-holes. Their external orifices are like two slits, which do not lie parallel, but form an acute angle with each other. Through these openings the animal breathes.

"The eyes are very small, not larger than those of an ox; yet the whale appears to be quick of sight. They are situated about a foot above where the upper and under lip join.

"In the whale, the sense of hearing seems to be rather obtuse.

"The throat is so narrow as scarcely to admit a hen's egg.

"The fins are from four to five feet broad, and eight to ten feet long, and seem only to be used in bearing off their young, in turning, and giving a direction to the velocity produced by the tail.

"The tail is horizontal, from 20 to 30 feet in breadth, indented in the middle, and the two lobes pointed and turned outwards. In it lies the whole strength of the animal. By means of the tail, the whale advances itself in the water with greater or less rapidity; if the motion is slow, the tail cuts the water obliquely, like forcing a boat forward by the operation of sculling; but if the motion is very rapid, it is effected by an undulating motion of the rump.

"The skin in some whales is smooth and shining; in others, it is furrowed, like the water-lines in laid paper, but coarser.

"The colour is black, gray, and white, and a tinge of yellow about the lower parts of the head. The back, upper part of the head, most of the belly, the fins, tail, and part of the under jaw, are deep black. The fore part of the under jaw, and a little of the belly, are white, and the junction of the tail with the body gray. Such are the common colours of the adult whale. I have seen piebald whales. Such whales as are below size are almost entirely of a bluish black colour. The skin of suckers is of a pale bluish colour. The cuticle, or scarf-skin, is no thicker than parchment; the true skin is from three-fourths to an inch in thickness all over the body.

"Immediately beneath the skin lies the blubber, or fat, from 10 to 20 inches in thickness, varying in different parts of the body, as well as in different individuals. The colour, also, is not always the same, being white, red, and yellow; and it also varies in denseness. It is principally for the blubber that the Greenland fishery is carried on. It is cut from the body in large lumps, and carried on board the ship, and then cut into smaller pieces. The fleshy parts, and skin connected with the blubber, are next separated from it, and it is again cut

into such pieces as will admit of its being passed into casks by the bung-hole, which is only three or four inches in diameter. In these casks it is conveyed home, where it is boiled in vessels capable of containing from three to six tons, for the purpose of extracting the oil from the fritters, which are tendinous fibres, running in various directions, and containing the oil or rather connecting together the cellular substance which contains it. These fibres are finest next the skin, thinnest in the middle, and coarsest near the flesh.

"The whales, according to their size, produce from two to twenty tons of oil. The flesh of the young whale is of a fine red colour; that of the old approaches to black, and is coarse, like that of a bull, and is said to be dry and lean when boiled, because there is little fat intermixed with the flesh.

"The food of the whale is generally supposed to consist of different kinds of *sepia*, *medusæ*, or the *clio limacina* of Linnæus; but I have great reason to believe, that it is chiefly, if not altogether, of the squill or shrimp tribe; for, on examining the stomach of one of large size, nothing else was found in it; they were about half an inch long, semi-transparent, and of a pale red colour. I also found a great quantity in the mouth of another, having been apparently vomited by it. When the whale feeds, it swims with considerable velocity under water, with its mouth wide open; the water enters by the forepart, but is poured out again at the sides, and the food is entangled and sifted as it were by the whalebone, which does not suffer any thing to escape.

"It seldom remains longer below the surface than twenty to thirty minutes; when it comes up again to blow, it will perhaps remain ten, twenty, or thirty minutes at the surface of the water, when nothing disturbs it. In calm weather, it sometimes sleeps in this situation. It sometimes ascends with so much force, as to leap entirely out of the water; when swimming at its greatest velocity, it moves at the rate of seven to nine miles an hour.

"Its maternal affection deserves notice. The young one is frequently struck for the sake of its mother, which will soon come up close by it, encourage it to swim off, assist it by taking it under its fin, and seldom deserts it while life remains. It is then very dangerous to approach, as she loses all regard for her own safety in anxiety for the preservation of her cub, dashing about most violently, and not dreading to rise even amidst the boats. Except, however, when the whale has young to protect, the male is in general more active and dangerous than the female, especially males of about nine feet bone."

To the above account of Mr. Scoresby's, we shall add the following particulars :

The fidelity of whales to each other exceeds whatever we are told even of the constancy of birds. Some fishers, as Anderson informs us, having struck one of two whales, a male and a female, that were in company together, the wounded fish made a long and terrible resistance; it struck down a boat with three men in it, with a single blow of its tail, by which all went to the bottom. The other still attended its companion and lent it every assistance; till, at last, the fish that was struck sunk under the number of its wounds; while its faithful associate, disdaining to survive the loss, with great bel-lowing stretched itself upon the dead fish, and shared its fate.

Inoffensive as the whale is, it is not without enemies. There is a small animal, of the shell-fish kind, called the whale-louse, that sticks to its body as we see shells sticking to the foul bottom of a ship. This insinuates itself chiefly under the fins; and whatever efforts the great animal makes, it still keeps its hold, and lives upon the fat, which it is provided with instruments to arrive at.

The sword-fish is, however, the whale's most terrible enemy. At the sight of this little animal, the whale seems agitated in an extraordinary manner, leaping from the water as if with affright, whenever it appears; the whale perceives it at a distance, and flies from it in the opposite direction. The whale has no instrument of defence except the tail; with that it endeavours to strike the enemy, and a single blow taking place would effectually destroy its adversary; but the sword-fish is as active as the other is strong, and easily avoids the stroke; then bounding into the air, it falls upon its enemy, and endeavours not to pierce with its pointed beak, but to cut with its toothed edges. The sea all about is soon dyed with blood, proceeding from the wounds of the whale; while the enormous animal vainly endeavours to reach its invader, and strikes with its tail against the surface of the water with impotent fury, making a report at each blow louder than the noise of a cannon.

There is still another powerful enemy of this fish, which is called the oria, or killer. A number of these are said to surround the whale in the same manner as dogs get round a bull. Some attack it with their teeth behind; others attempt it before; until, at last, the great animal is torn down, and its tongue is said to be the only part they devour, when they have made it their prey.

But of all the enemies of these enormous fishes, man is the greatest and most formidable; he alone destroys more in a year than the rest in an age, and actually has thinned their numbers in that part of the world where they are chiefly sought

The reader will be interested in the following account of
THE WHALE FISHERY.

As when enclosing harpooners assail,
 In hyperborean seas, the slumbering whale;
 Soon as their javelins pierce the scaly side,
 He groans, he darts impetuous down the tide;
 And rack'd all o'er with lacerating pain,
 He flies remote beneath the flood in vain.

Falconer.

Whales are chiefly caught in the North Sea : the largest sort are found about Greenland, or Spitzbergen. At the first discovery of this country, whales not being used to be disturbed, frequently came into the very bays, and were accordingly killed almost close to the shore, so that the blubber being cut off, was immediately boiled into oil on the spot. The ships, in those times, took in nothing but the pure oil and the fins, and all the business was executed in the country ; by which means, a ship could bring home the product of many more whales, than she can according to the present method of conducting this trade. The fishery also was then so plentiful, that they were obliged sometimes to send other ships to fetch off the oil they had made, the quantity being more than the fishing ships could bring away. But time and change of circumstances have shifted the situation of this trade. The ships coming in great numbers from Holland, Denmark, Hamburgh, and other northern countries, all intruders upon the English, who were the first discoverers of Greenland, disturbed the whales, which gradually, as other fish often do, forsaking the place, were not to be killed so near the shore as before ; but they are now found, and have been so ever since, in the openings and spaces among the ice, where they have deep water, and where they go sometimes a great many leagues from the shore.

The whale fishery begins in May, and continues all June and July ; but whether the ships have good or bad success, they must come away, and get clear of the ice by the end of August, so that in the month of September, at farthest, they may be expected home ; but a ship that meets with a fortunate and early fishery in May, may return in June or July.

The manner of taking whales at present is as follows : As soon as the fishermen hear the whale blow, they cry out, *Fall ! fall !* and every ship gets out its long-boat, in each of which there are six or seven men, who row till they become pretty near the whale ; then the harpooner strikes it with the harpoon : this requires great dexterity, for through the bone of his head there is no striking, but near his spout there is a soft piece of flesh, into which the iron sinks with ease. As soon as he is struck, they take care to give him rope enough, otherwise, when he goes down, as he frequently does, he would

inevitably sink the boat: this rope he draws with such violence, that, if it were not well watered, it would, by its friction against the sides of the boat, be soon set on fire. The line fastened to the harpoon is six or seven fathoms long, and is called the fore-runner; it is made of the finest and softest hemp, that it may slip the easier: to this they join a heap of lines of 90 or 100 fathoms each, and when there are not enough in one long-boat, they borrow from another. The man at the helm observes which way the rope goes, and steers the boat accordingly, that it may run exactly out before; for the whale runs away with the line with so much rapidity, that he would upset the boat if it were not kept straight. When the whale is struck, the other long-boats row before, and observe which way the line stands, and sometimes pull it: if they feel it stiff, it is a sign the whale still pulls in strength: but if it hangs loose, and the boat lies equally high before and behind upon the water, they pull it in gently, but take care to coil it, that the whale may have it again easily, if he recovers strength: they take care, however, not to give him too much line, because he sometimes entangles it about a rock, and pulls out the harpoon. The fat whales do not sink as soon as dead, but the lean ones do, and come up some days afterwards. As long as they see whales, they lose no time in cutting up what they have taken, yet keep fishing for others: when they see no more, or have taken enough, they begin with taking off the fat and whiskers in the following manner. The whale being lashed alongside, they lay it on one side, and put two ropes, one at the head and the other in the place of the tail, (which, together with the fins, is struck off as soon as he is taken,) to keep those extremities above water. On the off-side of the whale are two boats, to receive the pieces of fat, utensils, and men, that might otherwise fall into the water on that side. These precautions being taken, three or four men, with irons at their feet to prevent slipping, get on the whale, and begin to cut out pieces of about three feet thick and eight long, which are hauled up at the capstan or windlass. When the fat is all cut off, they cut off the whiskers of the upper jaw with an axe, previously lashing them together to keep them firm, which also facilitates the cutting, and prevents them from falling into the sea; when on board, five or six of them are bundled together, and properly stowed: and after all is got off, the carcase is turned adrift, and devoured by the bears, who are very fond of it. In proportion as the large pieces of fat are cut off, the rest of the crew are employed in slicing them smaller, and picking out all the lean. When this is prepared, they stow it under the deck, where it lies till the fat of all the whales is on board: then cutting it still smaller, they put it up in tubs in the hold.

cramming them very full and close. Nothing now remains but to sail homewards, where the fat is to be boiled, and melted down into train oil.

During the summer of 1821, an attempt was made to kill whales with Sir William Congreve's rockets. The trial was conducted by William Scoresby, Esq. who took out with him, on board of the *Fame*, in which he sailed, several rockets, by way of experiment. Success attended his expectation; and little doubt can remain, if they continue to be skilfully applied, that the danger attending the harpoon will be nearly done away; and, consequently, this valuable branch of commerce will be essentially benefited by the discovery.

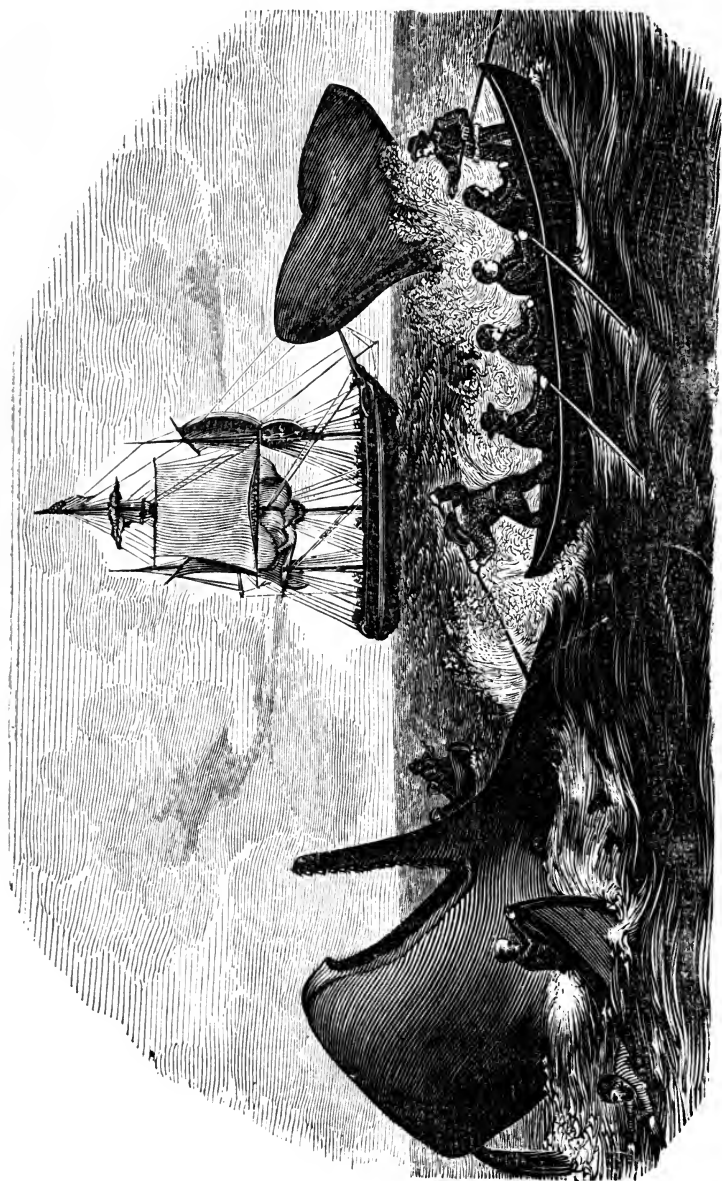
We shall conclude this short sketch of some of the curiosities respecting fishes, with an account of *THE KRAKEN*.—This is a most amazingly large sea animal, said to be seemingly of a crab-like form; the credit of whose existence rests upon the evidence produced by Bishop Pontoppidan, in his *Natural History of Norway*.

“Our fishermen (says the author) unanimously and invariably affirm, that, when they are several miles from the land, particularly in the hot summer days, and, by their distance, and the bearings of some points of land, expect from eighty to a hundred fathoms depth, and do not find but from twenty to thirty,—and especially if they find a more than usual plenty of cod and ling,—they judge the kraken to be at the bottom: but if they find by their lines that the water in the same place still shallows on them, they know he is rising to the surface, and row off with the greatest expedition till they come into the usual soundings of the place; when, lying on their oars, in a few minutes the monster emerges, and shews himself sufficiently, though the whole body does not appear. Its back or upper part, which seems an English mile and a half in circumference, (some have affirmed, considerably more than this,) looks at first like a number of small islands, surrounded with something that floats like sea-weeds; at last several bright points of horns appear, which grow thicker the higher they emerge, and sometimes stand up as high and large as the masts of middle-sized vessels. In a short time it slowly sinks, which is thought as dangerous as its rising; as it causes such a swell and whirlpool as draws every thing down with it, like that of Maelstrom.”

The Bishop justly regrets the omission of probably the only opportunity that ever has or may be presented of surveying it alive, or seeing it entire when dead. This, he informs us, once did occur, on the credit of the Rev. Mr. Früs, minister at Nordland, and vicar of the college for promoting Christian knowledge; who informed him, that in 1680, a kraken (perhaps a



TERRIBLE ADVENTURE WITH A SHARK



THE WHALE FISHERY

The engraving represents the lancing of the whale, who has already been harpooned, and is in a dying state. In his last struggles he has broken one of the whalers' boats.

young and careless one, as they generally keep several leagues from land) came into the waters that run between the rocks and cliffs near Alstahong; where, in turning about, some of its long horns caught hold of some adjoining trees, which it might easily have torn up, but that it was also entangled in some clefts of the rocks, whence it could not extricate itself, but putrefied on the spot.

Our author has heard of no person destroyed by this monster; but he relates a report of the danger of two fishermen, who came upon a part of the water full of the creature's thick slimy excrements, (which he voids for some months, as he feeds for some other;) they immediately strove to row off, but were not quick enough in turning to save the boat from one of the kraken's horns, which so crushed the head of it, that it was with difficulty they saved their lives on the wreck, though the weather was perfectly calm, the monster never appearing at other times. His excrement is said to be attractive of other fish on which he feeds; which expedient was probably necessary, on account of his slow unwieldy motion, to his subsistence; as this slow motion again may be necessary to the security of ships of the greatest force and burden, which must be overwhelmed on encountering such an immense animal, if his velocity were equal to his weight; the Norwegians supposing, that if his arms, on which he moves, and with which he takes his food, were to lay hold of the largest man of war, they would pull it down to the bottom.

In confirmation of the reality of this animal, our learned author cites Debes's Description of Faroe, for the existence of certain islands, which suddenly appear and as suddenly vanish. Many seafaring people, he adds, give accounts of such, particularly in the North Sea; which their superstition has either attributed to the delusion of the Devil, or considered as inhabited by evil spirits. But our honest historian, who is not for wronging even the Devil himself, supposes such mistaken islands to be nothing but the kraken, called by some the *soe troldeu*, or sea-mischief; in which opinion he was greatly confirmed by the following quotation of Dr. Hierne, a learned Swede, from Baron Grippenheilm; and which is certainly a very remarkable passage, viz. "Among the rocks about Stockholm, there is sometimes seen a tract of land, which at other times disappears, and is seen again in another place. Buræus has placed it as an island, in his map. The peasants, who call it *Gummars-ore*, say, that it is not always seen, and that it lies out in the open sea; but I could never find it. One Sunday, when I was out amongst the rocks, sounding the coast, it happened, that in one place I saw something like three points of land in the sea, which surprised me a little, and I thought I had inadvertently passed them over before. Upon

this, I called to a peasant, to inquire for Gummars-ore; but when he came, we could see nothing of it; upon which, the peasant said, all was well, and that this prognosticated a storm, or a great quantity of fish." To which our author subjoins, "Who cannot discover that this Gummars-ore, with its points and prognostications of fish, was the kraken, mistaken by Buræus for an island, which may keep itself about that spot where he rises?" He takes the kraken, doubtless, from his numerous tentaculi, which serve him as feet, to be of the polypus kind; and the contemplation of its enormous bulk led him to adapt a passage from Ecclesiasticus, xliii. 31, 32. to it. Whether by it may be intended the "dragon that is in the sea," mentioned Isaiah xxvii. 1. we refer to the conjecture of the reader.

After paying but a just respect to the moral character, the reverend function, and diligent investigations, of our author, we must admit the possibility of its existence, as it implies no contradiction; though it seems to encounter a general prepossession of the whale's being the largest animal on or in our globe, and the eradication of any long prepossession is attended with something irksome to us. But were we to suppose a salmon or a sturgeon the largest fish any number of persons had seen or heard of, and the whale had discovered himself as seldom, and but in part, as the kraken, it is easy to conceive that the existence of the whale had been as indigestible to such persons then, as that of the kraken may be to others now.

Some may incline to think such an extensive monster would encroach on the symmetry of nature, and would be over proportionate to the size of the globe itself; as a little calculation will inform us, that the breadth of what is seen of him, supposing him nearly round, must be full 2600 feet, (if more oval, or crab-like, full 2000 feet,) and his thickness, which may rather be called altitude, at least 300 feet; our author declaring he has chosen the least circumference mentioned of this animal, for the greater certainty. These vast dimensions, nevertheless, we apprehend will not argue conclusively against the existence of the animal, though considerably against a numerous increase or propagation of it. In fact, the great scarcity of the kraken, his confinement to the North Sea, and perhaps to equallatitudes in the south; the small number propagated by the whale, which is viviparous; and by the largest land animals, of which the elephant is said to go nearly two years with young; all induce us to conclude, from analogy, that this creature is not numerous; which coincides with a passage in a manuscript ascribed to Svere, king of Norway, and it is cited by Ol. Wormius, in his *Museum*, p. 280, in Latin, which we shall exactly translate:—

"There remains one kind, which they call *hasgufe*, whose magnitude is unknown, as it is seldom seen. Those who affirm they have seen its body, declare, it is more like an island than a beast, and that its carcase was never found; whence some imagine that there are but two of the kind in nature."

Whether the vanishing island Lemair, of which captain Rodney went in search, was a kraken, we submit to the fancy of our readers. In fine, if the existence of the creature is admitted, it will seem a fair inference, that he is the scarcest as well as the largest in our world; and that if there are larger in the universe, they probably inhabit some sphere or planet more extended than our own, and such we have no pretence to limit; but that fiction can devise a much greater than this, is evident from the cock of Mahomet, and the whale in the Bava Bathra of the Talmud, which were intended to be credited; and to either of which, our kraken is a very shrimp in dimensions.

We conclude this account in the words of Goldsmith: "To believe all that has been said of these animals, would be too credulous; and to reject the possibility of their existence, would be a presumption unbecoming mankind."

CHAP. XVIII.

CURIOSITIES RESPECTING SERPENTS AND WORMS.

The Scorpion—The Boa Constrictor—The American Sea Serpent—Fascinating Serpents—The Caterpillar—Caterpillar Eaters—The Silk-Worm—The Tape-Worm—The Ship-Worm—The Lizard imbedded in Coal.

THE SCORPION.

Their flaming crests above the waves they shew,
 Their bellies seem to burn the seas below;
 Their speckled tails advance to steer their course,
 And on the sounding shore the flying billows force.
 And now the strand and now the plain they held;
 Their ardent eyes with bloody streaks are fill'd;
 Their nimble tongues they brandish'd as they came,
 And lick'd their hissing jaws that sputter'd flame. *Dryden.*

Of all the classes of noxious insects, the scorpion is the most terrible. Its shape is hideous; its size among the insects is enormous; and its sting is generally fatal. Happily for Britain, the scorpion is entirely unknown among us. In several parts of the continent of Europe, it is too well known, though it seldom grows above four inches long; but in the

warm tropical climates, it is seen a foot in length, and in every respect as large as a lobster, which it somewhat resembles in shape. There have been enumerated nine different kinds of this dangerous insect, including species and varieties, chiefly distinguished by their colour; there being scorpions yellow, brown, and ash-coloured; others that are the colour of rusty iron, green, pale yellow, black, claret colour, white, and gray. There are four principal parts distinguishable in this creature; the head, the breast, the belly, and the tail. The scorpion's head seems, as it were, jointed to the breast, in the middle of which are seen two eyes; and a little more forward, two eyes more, placed in the fore part of the head; these eyes are so small, that they are scarcely perceivable, and it is probable the creature has but little occasion for them. The mouth is furnished with two jaws; the undermost is divided into two, and the parts notched into each other, which serve the creature as teeth, and with which it breaks its food, and thrusts it into its mouth; these the scorpion can at pleasure pull back into its mouth, so that no part of them can be seen. On each side of the head are two arms, each composed of four joints; the last of which is large, with strong muscles, and made in the manner of the claw of a lobster. Below the breast are eight articulated legs, each divided into six joints; the two hindmost of which are each provided with two crooked claws, here and there covered with hair. The belly is divided into seven little rings; from the lowest of which is continued a tail, composed of six joints, which are bristly, and formed like little globes, the last being armed with a crooked sting. This is that fatal instrument, which renders this insect so formidable; it is long, pointed, hard, and hollow; it is pierced near the base with two small holes, through which, when the creature stings, it ejects a drop of poison, which is white, caustic, and fatal. The reservoir in which this poison is kept, is a small bladder near the tail, into which the venom is distilled by a peculiar apparatus. If this bladder be greatly pressed, the venom will be seen issuing out through the two holes above mentioned; it therefore appears, that when the creature stings, the bladder is pressed, and the venom issues through the two apertures into the wound.

There are few animals more formidable, or more truly mischievous, than the scorpion. As it takes refuge in a small place, and is generally found sheltering in houses, it must frequently sting those among whom it resides. In some of the towns of Italy, and in France, in the ci-devant province of Languedoc, it is one of the greatest pests that torment mankind; but its malignity in Europe is trifling, when compared to what the natives of Africa and the East are known to experience.

In Batavia, where they grow twelve inches long, there is no removing any piece of furniture without the utmost danger of being stung by them. Bosman assures us, that along the Gold Coast they are often found larger than a lobster, and that their sting is inevitably fatal.

In Europe, however, they are by no means so large, so venomous, or so numerous. The general size of this animal does not exceed two or three inches, and its sting is very seldom fatal. No animal in the creation seems endued with such an irascible nature; they have often been seen, when taken and put into a place of security, to exert all their rage against the sides of the glass vessel that contained them. They will attempt to sting a stick when put near them, and attack a mouse or a frog, while these animals are far from offering any injury. Maupertuis put three scorpions and a mouse into the same vessel together, and they soon stung the little animal in different places. The mouse, thus assaulted, stood for some time upon the defensive, and at last killed them all, one after another. He tried these experiments, in order to see whether the mouse, after it had killed, would eat the scorpions; but the little quadruped seemed satisfied with the victory, and even survived the severity of the wounds it had received.

Wolkemar tried the courage of the scorpion against the large spider, and inclosed several of both kinds in glass vessels for that purpose. The success of this combat was very remarkable. The spider at first used all his efforts to entangle the scorpion in his web, which it immediately began spinning; but the scorpion rescued itself from the danger, by stinging its adversary to death; and soon after cut off, with its claws, all the legs of the spider, and then sucked all the internal parts at its leisure. If the scorpion's skin had not been so hard, Wolkemar is of opinion that the spider would have obtained the victory; for he had often seen one of these spiders destroy a toad.

The fierce spirit of this animal is equally dangerous to its own species, for scorpions are the cruellest enemies to each other. Maupertuis put about a hundred of them together in the same glass; and they scarcely came in contact before they began to exert all their rage in mutual destruction: there was nothing to be seen but one universal carnage, without **any** distinction of age or sex; so that in a few days there remained only fourteen, which had killed and devoured all the rest. But their unnatural malignity is still more apparent, in their cruelty to their offspring. He inclosed a female scorpion, big with young, in a glass vessel, and she was seen to devour them as fast as they were excluded; there was but one of the number that escaped the general destruction, by taking

refuge on the back of its parent ; and this soon after revenged the cause of its brethren, by killing the old one in its turn. Such is the terrible and unrelenting nature of this insect, that it is asserted, when driven to an extremity, that the scorpion will even destroy itself. The following experiment was ineffectually tried by Maupertuis : “ But (says Mr. Goldsmith) I am so well assured of it by many eye-witnesses, who have seen it both in Italy and America, that I have no doubt remaining of its veracity. A scorpion newly caught is placed in the midst of a circle of burning charcoal, and thus an egress prevented on every side ; the scorpion, as I am assured, runs about a minute round the circle, in hopes of escaping, but finding that impossible, it stings itself on the back of the head, and in this manner the undaunted suicide instantly expires.”

It is happy for mankind that these animals are so destructive to each other ; since otherwise they would multiply in so great a degree as to render some countries uninhabitable. The male and female of this insect are very easily distinguishable ; the male being smaller, and less hairy. The female brings forth her young alive, and perfect in their kind. Redi having bought a quantity of scorpions, selected their females, and, putting them in separate glass vessels, kept them for some days without food. In about five days one of them brought forth thirty-eight young ones, well shaped, and of a milk-white colour, which changed every day more and more into a dark rusty hue. Another female, in a different vessel, brought forth twenty-seven of the same colour ; and the day following, the young ones seemed all fixed to the back and belly of the female. For near a fortnight all these continued alive and well, but afterwards some of them died daily ; until, in about a month, they all died, except two. Were it worth the trouble, these animals might be kept living as long as curiosity should think proper. Their chief food is worms and insects ; and upon a proper supply of these, their lives might be lengthened to their natural extent : how long that may be we are not told ; but, if we may argue from analogy, it cannot be less than seven or eight years, and perhaps, in the larger kind, double that duration. As they have somewhat the form of a lobster, so they resemble that animal in casting their shell ; or, more properly, their skin, since it is softer by far than the covering of the lobster, and set with hairs, which grow from it in great abundance, particularly at the joinings. The young, prior to their birth, lie each covered up in its own membrane to the number of forty or fifty, and united to each other by an oblong thread, so as to exhibit altogether the form of a chaplet.

Such is the manner in which the common scorpion produces its young ; but there is a scorpion of America, produced from the egg, in the manner of the spider. The eggs are no larger

than pin's points; and they are deposited in a web, which they spin from their bodies, and carry about with them till they are hatched. As soon as the young ones are excluded from the shell, they get upon the back of the parent, who turns her tail over them, and defends them with her sting. It seems probable, therefore, that captivity produces that unnatural disposition in the scorpion, which induces it to destroy its young; since, at liberty, it is found to protect them with such unceasing assiduity.

Another subject of curiosity belonging to this class, is, **THE BOA CONSTRICTOR**.—A serpent very remarkable for its vast size; some of the principal species of which are met with in India, Africa, and South America, and have been seen between thirty and forty feet long, possessed of so much strength as to be able to kill cattle by twisting around them, and crushing them to death by pressure, after which they devour them, eating till they are almost unable to move; and in that state they may be easily shot. Dr. Shaw observes, that these gigantic serpents are become less common, in proportion to the increased population of the parts where they are found; they are, however, still to be seen, and they will approach the abodes of man in the vicinity of their residence. This species is beautifully variegated with rhombic spots; the belly is whitish; it is of vast strength, and from thirty to thirty-six feet long. With respect to age, sex, and climate, it is subject to great variations.

It is supposed that an individual of this species once diffused terror and dismay through a whole Roman army; a fact alluded to by Livy in one of the books that have not come to us, but which is quoted by Valerius Maximus, in words to the following effect: "Since we are on the subject of uncommon phenomena, we may here mention the serpent so eloquently recorded by Livy, who says, that near the river Bagrada, in Africa, a snake was seen of such enormous magnitude, as to prevent the army of Attilius Regulus from the use of the river; and after snatching up several soldiers with its enormous mouth, and devouring them, and killing several more by striking and squeezing them with the spires of its tail, it was at length destroyed by assailing it with all the force of military engines and showers of stones, after it had withstood the attack of their spears and darts; that it was regarded by the whole army as a more formidable enemy than even Carthage itself; and that the whole adjacent region being tainted with the pestilential effluvia proceeding from its remains, and the waters with its blood, the Roman army was obliged to remove its station. The skin of the monster was 120 feet long, and was sent to Rome as a trophy."

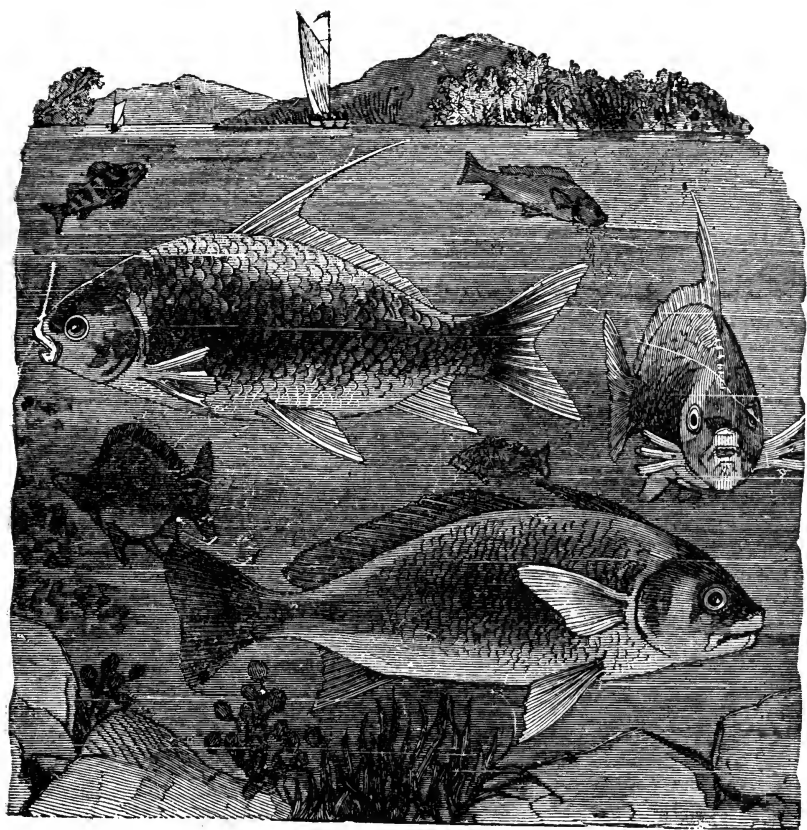
Another account says, that "it caused so much trouble to

Regulus, that he found it necessary to contest the possession of the river with it, by employing the whole force of the army, during which a considerable number of soldiers were lost, while the serpent could neither be vanquished nor wounded; the strong armour of its scales easily repelling the force of all the weapons that were directed against it: upon which recourse was had to battering engines, with which the animal was attacked in the manner of a fortified tower, and was thus at length overpowered. Several discharges were made against it without success, till its back being broken by an immense stone, the monster began to lose its powers, and was with difficulty destroyed, after having diffused such a horror among the army, that they confessed they would rather attack Carthage itself, than such another monster."

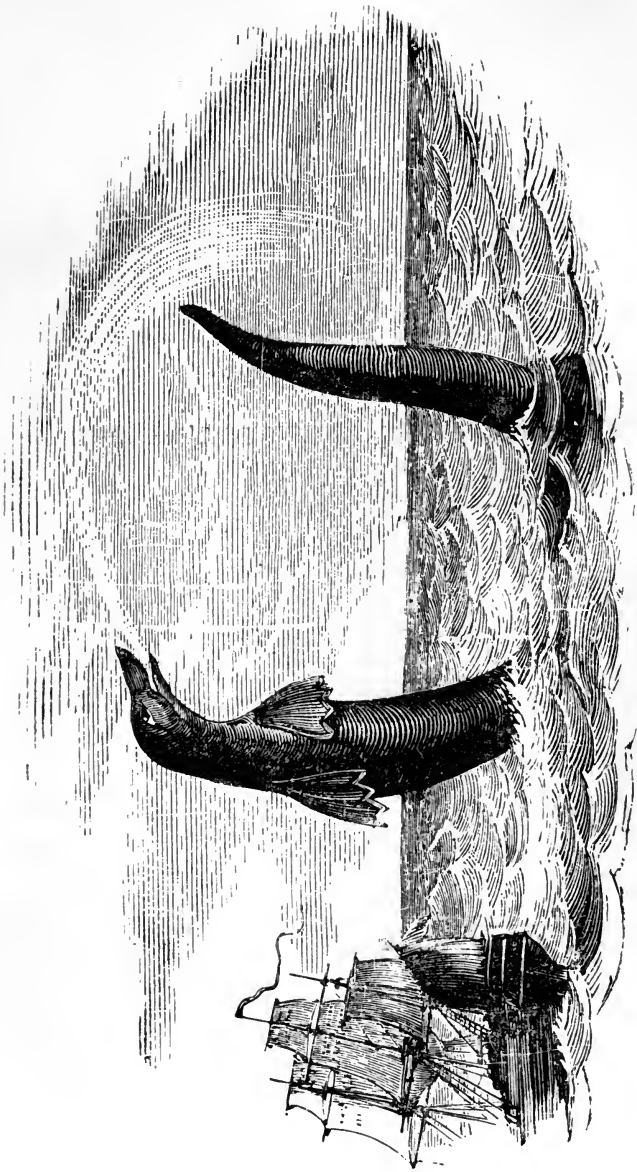
The flesh of the serpent is eaten by the Indians and Negroes of Africa, and they make its skin into garments.

The following account of **THE AMERICAN SEA SERPENT**, is given in the words of an eye-witness:—"I, the undersigned Joseph Woodward, captain of the Adamant schooner, of Hingham, being on my rout from Penobscot to Hingham, steering W. N. W., and being about ten leagues from the coast, perceived, last Sunday, at two P. M. something on the surface of the water, which seemed to me to be of the size of a large boat. Supposing that it might be part of the wreck of a ship, I approached; but when I was within a few fathoms of it, it appeared, to my great surprise, and that of my whole crew, that it was a monstrous serpent. When I approached nearer, it coiled itself up, instantly uncoiling itself again, and withdrew with extreme rapidity. On my approaching again, it coiled itself up a second time, and placed itself at the distance of sixty feet at most, from the bow of the ship.

"I had one of my guns loaded with a cannon ball and musket bullets. I fired it at the head of the monster; my crew and myself distinctly heard the ball and bullets strike against the body, from which they rebounded, as if they had struck against a rock. The serpent shook his head and tail in an extraordinary manner, and advanced toward the ship with open jaws. I had caused the cannon to be reloaded, and pointed it at his throat; but he had come so near, that all the crew were seized with terror, and we thought only of getting out of his way. He almost touched the vessel, and had not I tacked as I did, he would certainly have come on board. He dived; but in a moment we saw him appear again, with his head on one side of the vessel, and his tail on the other, as if he was going to lift us up and upset us. However, we did not feel any shock. He remained five hours near us, only going backward and forward.



THE FROG FISH.



A SEA SERPENT

"The fears with which he at first inspired us having subsided, we were able to examine him attentively. I estimate, that his length is at least twice that of my schooner, that is to say, 130 feet; his head is full twelve or fourteen; the diameter of the body below the neck, is not less than six feet; the size of the head is in proportion to that of the body. He is of a blackish colour, his ear-holes, (ornes,) are about twelve feet from the extremity of his head. In short, the whole has a terrible look. When he coils himself up, he places his tail in such a manner, that it aids him in darting forward with great force: he moves in all directions with the greatest facility and astonishing rapidity.

(Signed,)

"JOSEPH WOODWARD."

"*Hingham, May 12, 1818.*"

This declaration is attested by Peter Holmes and John Mayo, who made affidavit of the truth of it before a justice of peace.

On the FASCINATING POWER OF SERPENTS.—Major Alexander Garden, of South Carolina, has, in a paper read to the New York Historical Society, attributed the supposed power of fascination possessed by serpents, to a vapour which they can spread around them, and to objects at a little distance, at pleasure. He first reduces the exaggerated idea which has been entertained of this power, and then adduces instances of the effect of a sickening and stupifying vapour, perceived to issue from the animal. A negro is mentioned, who, from a very peculiar acuteness in smell, could discover the rattlesnake at a distance of two hundred feet, when in the exercise of this power; and on following this indication, always found some animal suffering from its influence.

We shall now give some curiosities respecting Worms; and first, of THE CATERPILLAR.—The larvæ of butterflies are universally known by the name of caterpillars, and are extremely various in their forms and colours, some being smooth, others beset with either simple or ramified spines, and some are observed to protrude from their front, when disturbed, a pair of short tentacula, or feelers, somewhat analogous to those of a snail. A caterpillar, when grown to its full size, retires to some convenient spot, and, securing itself properly by a small quantity of silken filaments, either suspends itself by the tail, hanging with its head downwards, or else in an upright position, with the body fastened round the middle by a number of filaments. It then casts off the caterpillar-skin, and commences chrysalis, in which state it continues till the butterfly is ready for birth, which, liberating itself from the skin of the chrysalis, remains till its wings, which are at first short, weak,

and covered with moisture, are fully extended; this happens in about a quarter of an hour, when the animal suddenly quits the state of inactivity to which it had been so long confined, and becomes at pleasure an inhabitant of the air.

It will now be proper to give some account of **THE CATERPILLAR-EATERS**.—Caterpillar-eaters are a species of worms bred in the body of the caterpillar, and which eat its flesh. These are produced by a certain kind of fly, that lodges her eggs in the body of this insect; and they, after their proper changes, become flies like their parents. Mr. Reaumur has given us, in his History of Insects, some very curious particulars respecting these little worms. Each of them spins itself a very beautiful case, of a cylindric figure, of a very strong sort of silk, in which this animal spends its state of chrysalis; and they have a mark by which they may be known from all other animal productions of this kind, which is, that they have always a broad stripe or band surrounding their middle, which is black when the rest of the case is white, and white when that is black. Mr. Reaumur has had the patience to find out the reason of this singularity. The whole shell is spun of a silk produced out of the creature's body; this at first runs all white, and towards the end of the spinning turns black. The outside of the case must necessarily be formed first, as the creature works from within; consequently this is truly white all over, but it is transparent, and shews the last spun, or black silk, through it. It might be supposed that the whole inside of the shell should be black; but this is not the case: the whole is fashioned before this black silk comes; and this is employed by the creature, not to line the whole, but to fortify certain parts only; and therefore is all applied either to the middle,—or to the two ends, omitting the middle,—or a blackness at both ends, leaving the white in the middle to appear. It is not uncommon to find a sort of small cases, in garden walks, which appear to move of themselves; when these are opened, they are found to contain a small living worm. This is one of the species of these caterpillar-eaters; which, as soon as it comes out of the body of that animal, spins itself a case for its transformation, and lives in it without food till that change comes on, when it becomes a fly, like that to which it owed its birth.

In the next place we shall introduce a subject of great curiosity, well known by the name of **THE SILK-WORM**.—The silk-worm is a species of caterpillar, and, like it, is formed of several moveable rings, and is well furnished with feet and claws, to rest and fix itself where it pleases. It has two rows of teeth, which do not move upwards and downwards, but

from right to left, which enables it to press, cut, and tear the leaves in every direction. Along the whole length of its back we perceive through its skin a vessel which performs the functions of a heart. On each side of this insect are nine orifices, which answer to as many lungs, and assist the circulation of the chyle, or nutritive juice. Under the mouth it has a kind of reel with two holes, through which pass two drops of the gum with which its bag is filled; they act like two distaffs, continually furnishing it with the materials of which it makes its silk. The gum which distils through the two holes takes their form, lengthens into a double thread, which suddenly loses the fluidity of the liquid gum, and acquires the consistency necessary to support or to envelope the worm. When that time arrives, it joins the two threads together, by gluing them one over the other with its fore feet. This double thread is not only very fine, but also very strong, and of great length. Each bag has a thread which is nearly five hundred ells long; and as this thread is double, and joined together throughout its length, each bag will be found to contain a thousand ells of silk, though the whole weight does not exceed two grains and a half.

The life of this insect in its vermiform state is very short, and it passes through different states till it gradually arrives at its greatest degree of perfection. When it first emerges from the egg, it is extremely small, perfectly black, and its head of a still brighter black than the rest of its body: in a few days it begins to grow white, or of an ash colour; its coat becomes dirty and ruffled; it casts it off, and appears in a new dress; it becomes larger and much whiter, though a little tinged with green, from feeding upon green leaves. After a few more days (the length of time varying according to the degree of heat and quality of its nourishment) it ceases to eat, and sleeps for about two days; it then agitates and frets itself extremely, becoming red with the efforts it makes; its skin wrinkles and shrivels up, and it throws it off a second time, together with its feet. Within the space of three weeks or a month, we see it fresh dressed three times. It now begins to eat again, and might be taken for a different creature, so much is the appearance of its head, colour, and figure, altered. After continuing to eat for some days, it falls again into a lethargic state; on recovering from which, it once more changes its coat, which makes the third since it issued from its shell. It continues to eat for some time, then, entirely ceasing to take any nutriment, prepares for itself a retreat, and draws out a silken thread, which it wraps round its body in the same manner as we might wind thread round an oval piece of wood. It remains quietly in the bag it has formed, and at the end of fifteen days would pierce it, to issue forth,

if it was not killed by being exposed to the heat of the sun, or shut up in an oven. The silk-bags are thrown into hot water, and stirred about with birch twigs to draw out the heads or beginning of the threads, and the silk is afterwards wound upon reels made for the purpose. Thus we are indebted to this little insect for our greatest luxury in clothing: a reflection which ought to humble our pride; for how can we be vain of the silk which covers us, when we reflect to what we are indebted for it, and how little we are instrumental in the formation of those beauties in our clothing, of which we are vain? Thus we find the most insignificant and despicable objects are the instruments of ornament and advantage to man; an insect that we scarcely condescended to look at, becomes a blessing to thousands of human beings, forms an important article of trade, and is the source of great riches.

Our next subject is, **THE TAPE-WORM.**—This genus of worms is destined to feed on the juices of various animals, and they inhabit the internal parts of almost every species of living beings. The structure and physiology of the *tænia* are curious, and it may be amusing as well as instructive to consider it with attention. The *tænia* appears destined to feed upon such juices of animals as are already animalized; and it is therefore most commonly found in the alimentary canal, and in the upper part, where there is the greatest abundance of chyle, for chyle seems to be the natural food of the *tænia*. As it is thus supported by food which is already digested, it is destitute of the complicated organs of digestion. As the *tænia solium* is most frequent in this country, it may be proper to describe it more particularly.

It is from three to thirty feet long; some say sixty feet. It is composed of a head, in which are a mouth adapted to drink up fluids, and an apparatus for giving the head a fixed situation. The body is composed of a great number of distinct pieces articulated together, each joint having an organ by which it attaches itself to the neighbouring part of the inner court of the intestine. The joints nearest the head are always small, and they become gradually enlarged as they are farther removed from it; but towards the tail a few of the last joints again become diminished in size. The extremity of the body is terminated by a small semicircular joint, which has no opening in it.

The head of this animal is composed of the same kind of materials as the other parts of its body; it has a rounded opening at its extremity, which is considered to be its mouth. This opening is continued by a short duct into two canals; these canals pass round every joint of the animal's body, and

convey the aliment. Surrounding the opening of the mouth, are placed a number of projecting radii, which are of a fibrous texture, and whose direction is longitudinal. These radii appear to serve the purpose of tentacula, for fixing the orifice of the mouth, from their being inserted along the brim of that opening. After the rounded extremity or head has been narrowed into the neck, the lower part becomes flattened, and has two small tubercles placed on each flattened side; the tubercles are concave in the middle, and appear destined to serve the purpose of suckers, for attaching the head more effectually. The internal structure of the joints composing the body of this animal is partly vascular and partly cellular; the substance itself is white, and somewhat resembles in its texture the coagulated lymph of the human blood. The alimentary canal passes along each side of the animal, sending a cross canal over the bottom of each joint, which connects the two lateral canals together.

Mr. Carlisle injected, with a coloured size, at a single push with a small syringe, three feet in length of these canals, in the direction from the mouth downwards. He tried the injection the contrary way, but it seemed to be stopped with valves. The alimentary canal is impervious at the extreme joint, where it terminates without any opening analogous to an anus. Each joint has a vascular joint occupying the middle part, which is composed of a longitudinal canal, from which a great number of lateral canals branch off at right angles. These canals contain a fluid like milk.

The *tænia* seems to be one of the simplest vascular animals in nature. The way in which it is nourished is singular; the food being taken in by the mouth, passes into the alimentary canal, and is thus made to visit in a general way the different parts of the animal. As it has no excretory ducts, it would appear that the whole of its alimentary fluid is fit for nourishment; the decayed parts probably dissolve into a fluid, which transudes through the skin, which is extremely porous.

This animal has nothing resembling a brain or nerves, and seems to have no organs of sense, but those of touch. It is most probably propagated by ova, which may easily pass along the circulating vessels of other animals. We cannot otherwise explain the phenomena of worms being found in the eggs of fowls, and in the intestines of a fœtus before birth, except by supposing their ova to have passed through the circulating vessels of the mother, and by this means to have been conveyed to the fœtus.

The chance of an ovum being placed in a situation where it will be hatched, and the young find convenient subsistence, must be very small; hence the necessity for their being very prolific. If they had the same powers of fecundity which

they now possess, and their ova were afterwards very readily hatched, then the multiplication of these animals would be immense, and become a nuisance to the other parts of the creation.

Another mode of increase allowed to *tænia*, (if we may call it increase,) is by an addition to the number of their joints. If we consider the individual joints as distinct beings, it is so; and when we reflect upon the power of individuality given to each joint, it makes this conjecture the more probable. We can hardly suppose that an ovum of a *tænia*, which at its full growth is thirty feet long, and composed of four hundred joints, contained a young *tænia* composed of this number of pieces; but we have seen young *tænia* not half a foot long, and not possessed of fifty joints, which still were entire worms. We have also many reasons to believe, that when a part of this animal is broken off from the rest, it is capable of forming a head for itself, and of becoming an independent being. The simple construction of the head makes its regeneration a much more easy operation than that of the tails and feet of lizards, which are composed of bones and complicated vessels; but this last operation has been proved by the experiments of Spallanzani, and many other naturalists.

An article of great curiosity is, THE SHIP-WORM.—This worm has a very slender, smooth, cylindrical shell; it inhabits the Indian seas, whence it was imported into Europe. It penetrates easily into the stoutest oak planks, and produces dreadful destruction to the ships, by the holes it makes in their sides: and it is to avoid the effects of this insect that vessels require sheathing.

The head of this creature is coated with a strong armour, and furnished with a mouth like that of the leech. A little above this it has two horns, which seem a kind of continuation of the shell; the neck is furnished with several strong muscles; the rest of the body is only covered by a very thin transparent skin, through which the motion of the intestines is plainly seen by the naked eye. This creature is wonderfully minute when newly excluded from the egg, but it grows to the length of four or six inches, and sometimes more. When the bottom of a vessel, or any piece of wood which is constantly under water, is inhabited by these worms, it is full of small holes; but no damage appears till the outer parts are cut away. Then their shelly habitations come into view, in which there is a large space for inclosing the animal, and surrounding it with water. There is an evident care in these creatures never to injure each other's habitations; by which means each case or shell is preserved entire. These worms will appear, on a very little consideration, to be most impor-

tant beings in the great chain of creation, and pleasing demonstrations of the infinitely wise and gracious Power, which formed, and still preserves the whole, in such wonderful order and beauty; for if it were not for the rapacity of these and such animals, tropical rivers, and indeed the ocean itself, would be choked with the bodies of trees which are annually carried down by the rapid torrents, as many of them would last for ages, and probably be productive of evils, of which, happily, we cannot in the present state of things form any idea; whereas, being consumed by these animals, they are more easily broken in pieces by the waves; and the fragments which are not devoured become specifically lighter, and are consequently more readily and more effectually thrown on shore, where the sun, wind, insects, and various other instruments, speedily promote their entire dissolution.

We shall conclude this chapter with an account of a singular curiosity that was found in a colliery. It is A LIVING LIZARD, IMBEDDED IN COAL.—This animal, preserved in spirits, is now in the possession of Mr. James Scholes, engineer to Mr. Fenton's colliery, near Wakefield. It is about five inches long; its back of a dark brown colour, and it appears rough and scaly; its sides are of a lighter colour, and spotted with yellow; the belly yellow, streaked with bands of the same colour as the back. Mr. S. related to me the following circumstances of its being found. In August last, they were sinking a new pit or shaft, and after passing through measures of stone, gray-bind, and blue stone, and some thin beds of coal, to the depth of one hundred and fifty yards, they came upon that intended to be worked, which is about four feet thick. When they had excavated about three inches of it, one of the miners (as he supposed) struck his pick, or mattock, into a crevice, and shattered the coal around into small pieces; he then discovered the animal in question, and immediately carried it to Mr. S.: it continued very brisk and lively for about ten minutes, then drooped and died. About four inches above the coal in which the animal was found, numbers of muscle-shells, in a fossil state, lay scattered in a loose gray earth.

CHAP. XIX

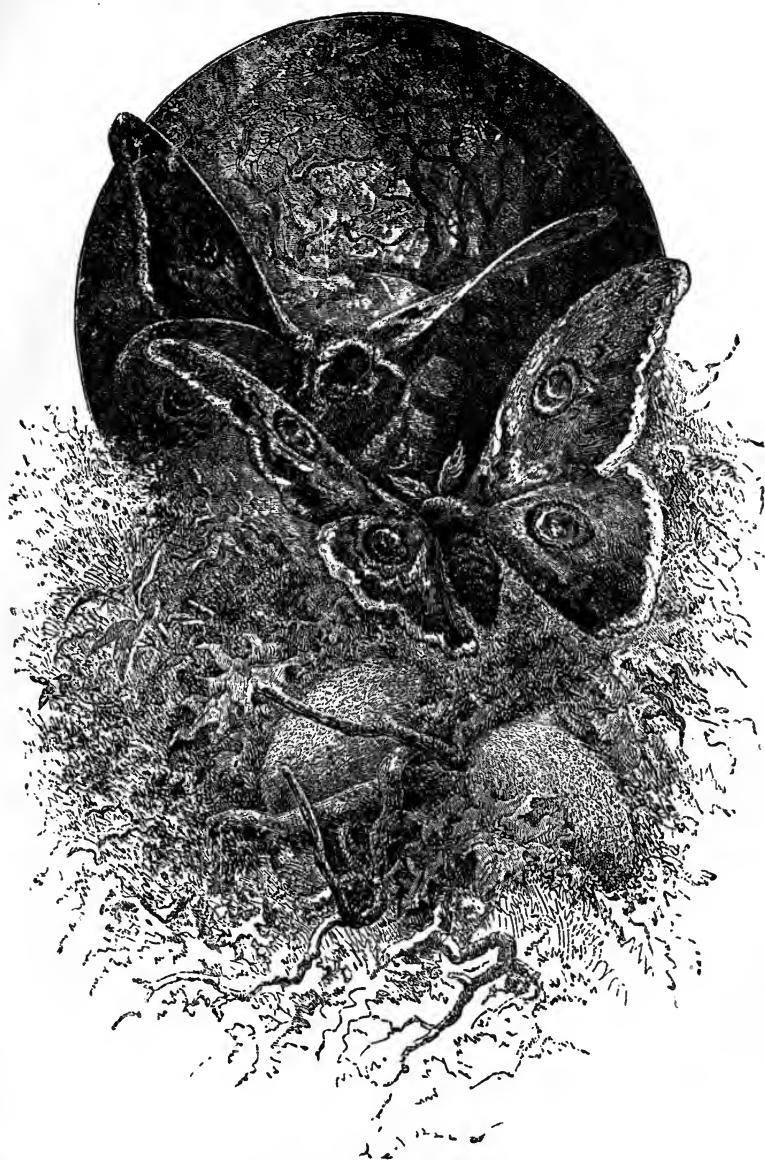
CURIOSITIES RESPECTING BIRDS.

The Common Peacock—The Egyptian Vulture—The Secretary Vulture—The Stork—The Great Pelican—The Bird of Paradise—The Ostrich—The Mocking-Bird of America—The Social Grosbeak—The Bengal Grosbeak—The Humming-Bird—The Golden Eagle.

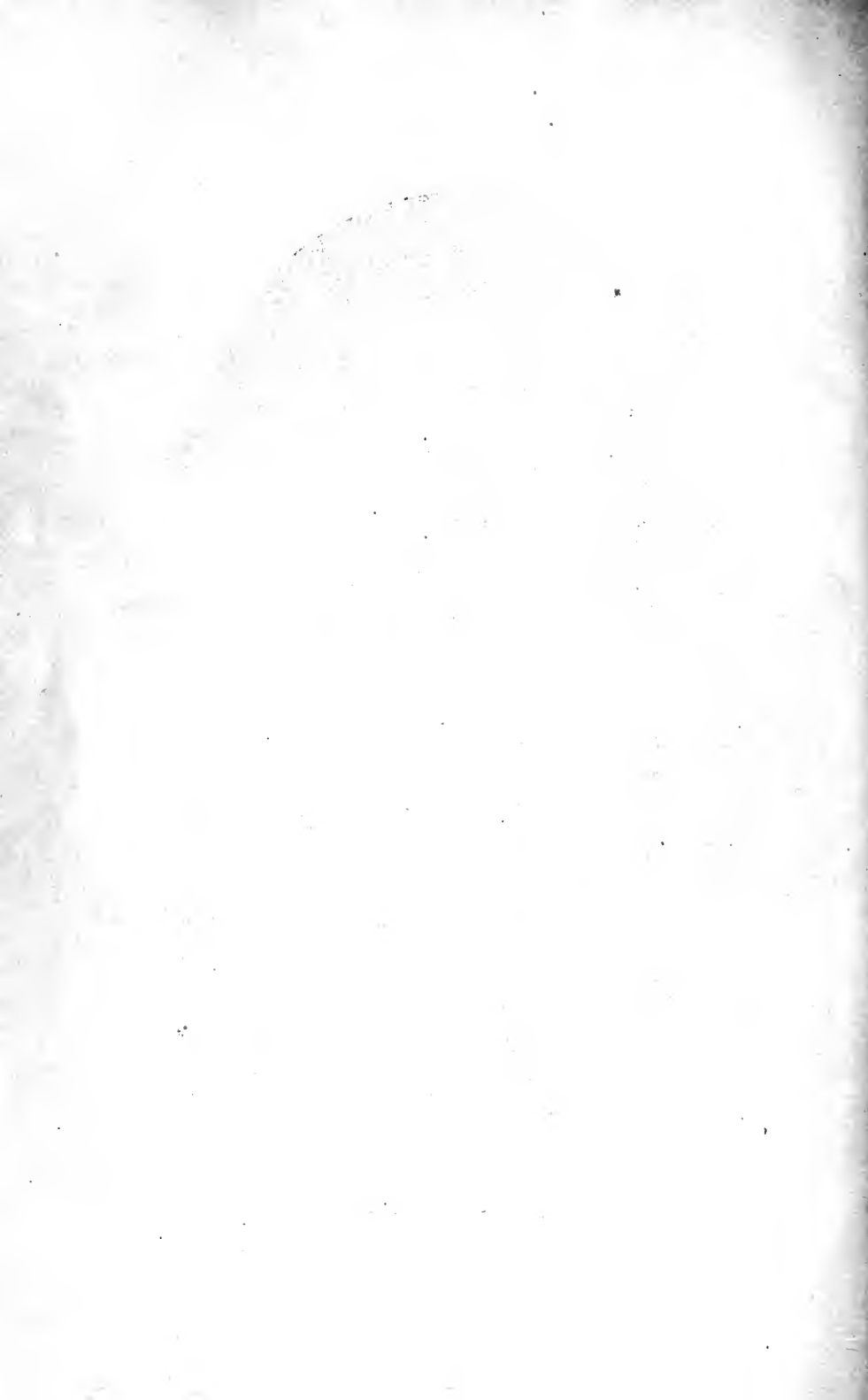
THE PEACOCK.

How rich the peacock ! what bright glories run
 From plume to plume, and vary in the sun !
 He proudly spreads them to the golden ray,
 And gives his colours to adorn the day ;
 With conscious state the spacious round displays,
 And slowly moves amid the waving blaze. Young.

THIS very beautiful and interesting bird has a compressed crest and solitary spurs. It is about the size of a turkey; the length from the top of the bill to the end of the tail being three feet eight inches. The bill is nearly two inches long, and is of a brown colour. The irides are yellow. On the crown there is a sort of crest, composed of twenty-four feathers, not webbed, except at the ends, which are gilded green. The shafts are of a whitish colour; and the head, neck, and breast, are of a green gold colour. Over the eye there is a streak of white, and beneath there is the same. The back and rump are of a green gold colour, glossed over with copper; the feathers are distinct, and lie over each other like shells. Above the tail springs an inimitable set of long beautiful feathers, adorned with a variegated eye at the end of each; these reach considerably beyond the tail, and the longest of them in many birds are four feet and a half long. This beautiful train, or tail, as it is improperly called, may be expanded in the manner of a fan, at the will of the bird. The true tail is hid beneath this group of feathers, and consists of eighteen gray-brown feathers, one foot and a half long, marked on the sides with rufous gray; the scapulars, and lesser wing coverts, are reddish cream colour, variegated with black; the middle coverts deep blue, glossed with green gold; the greatest and bastard wing, rufous; the quills are also rufous, some of them variegated with rufous, blackish, and green; the belly and vent are greenish black, the thighs yellowish, the legs stout, those of the male furnished with a strong spur, three-quarters of an inch in length, the colour of which is gray-brown.



SILK-WORMS.



These birds, now so common in Europe, are of Eastern origin. They are found wild in the islands of Ceylon and Java, in the East Indies; and at St. Helena, Barbuda, and other West India islands. They are not natural to China; but they are found in many places in Asia and Africa. They are, however, no where so large or so fine as in India, in the neighbourhood of the Ganges, whence they have spread into all parts, increasing in a wild state in the warmer climates, but requiring care in the colder regions. In ours, this species does not come to its full plumage till the third year. The female lays five or six grayish white eggs; in hot climates twenty, the size of those of a turkey. These, if let alone, she lays in some secret place, at distance from the usual resort, to prevent their being broken by the male, which he is apt to do if he find them. The time of sitting is from twenty-seven to thirty days. The young may be fed with curds, chopped leeks, barley-meal, &c. moistened; and they are fond of grasshoppers, and some other insects. In five or six months they will feed as the old ones, on wheat and barley, with what else they can pick up in the circuit of their confinement. They seem to prefer the most elevated places to roost on during the night; such as high trees, tops of houses, and the like. Their cry is loud and inharmonious,—a perfect contrast to their external beauty. They are caught in India, by carrying lights to the trees where they roost, and having painted representations of the bird presented to them at the same time; when they put out the neck to look at the figure, the sportsman slips a noose over the head, and secures his game. In most ages they have been esteemed a salutary food. Hortensius gave the example at Rome, where it was counted the highest luxury, and sold dear, and a young peacock is thought a dainty, even in the present times. The life of these birds is reckoned by some at about twenty-five years; by others a hundred.

So beautiful a species of birds as the peacock could not long remain unknown: so early as the days of Solomon, we find, among the articles imported in his Tarshish navies, apes and peacocks. Ælian relates, that they were brought into Greece from some barbarous country; and that they were held in such high esteem, that a male and female were valued at Athens at 1000 drachmæ, or £32. 5s. 10d. At Samos they were preserved about the temple of Juno, being sacred to that goddess; and Gellius, in his *Noctes Atticæ*, c. xvi. commends the excellency of the Samian peacocks. When Alexander was in India, he found vast numbers of wild ones on the banks of the Hyarotis; and was so struck with their beauty, as to appoint a severe punishment on any person that killed them. Peacocks' crests, in ancient times, were among the ornaments of the kings of England. Ernald de Aclent was fined to king John in one

hundred and forty palfreys, with sackbuts, lorams, gilt spurs, and peacocks' crests, such as would be for his credit.

We shall now introduce THE EGYPTIAN VULTURE.—The appearance of this bird is as horrid as can well be imagined. The face is naked and wrinkled; the eyes are large and black; the beak black and hooked; the talons large, and extended, ready for prey; and the whole body polluted with filth: these are qualities enough to make the beholder shudder with horror. Notwithstanding this, the inhabitants of Egypt cannot be thankful enough to Providence for this bird. All the places round Cairo are filled with the dead bodies of asses and camels, and thousands of these birds fly about and devour the carcases before they putrefy, and fill the air with noxious exhalations. The inhabitants of Egypt say, (and after them Maillet, in his description of Egypt,) that they yearly follow the caravan to Mecca, and devour the filth of the slaughtered beasts, and the carcases of the camels which die on the journey. They do not fly high, nor are they afraid of men. If one of them is killed, all the rest surround it in the same manner as do the Royston crows; they do not quit the places they frequent, though frightened by the explosion of a gun, but immediately return.

THE SECRETARY VULTURE.—This is a most singular species, being particularly remarkable from the great length of its legs, which at first sight would induce us to think it belonged to waders: but the characters of the vulture are so strongly marked throughout, as to leave no doubt to which class it belongs. This bird, when standing erect, is full three feet from the top of the head to the ground. The bill is black, sharp, and crooked, like that of an eagle; the head, neck, breast, and upper parts of the body, are of a bluish ash-colour; the legs are very long, stouter than those of a heron, and of a brown colour; claws shortish, but crooked, not very sharp, and of a black colour. From behind the head spring a number of long feathers, which hang loose behind, like a pendent crest; these feathers rise by pairs, and are longer as they are lower down on the neck; this crest, the bird can erect or depress at pleasure; it is of a dark colour, almost black; the webs are equal on both sides, and rather curled, and the feathers, when erected, somewhat incline towards the neck; the two middle feathers of the tail are twice as long as any of the rest. This singular species inhabits the internal parts of Africa, and is frequently seen at the Cape of Good Hope. It is also met with in the Philippine islands. As to the manners of this bird, it is on all hands allowed that it principally feeds on rats, lizards, snakes, and the like; and that it will become

familiar; whence Sonnerat is of opinion, that it might be made useful in some of our colonies, if encouraged, towards the destruction of those pests. They call it at the Cape of Good Hope, *flang-eater*, i. e. snake-eater. A great peculiarity belongs to it, perhaps observed in no other, which is, the faculty of striking forwards with its legs, never backwards. Dr. Solander saw one of these birds take up a snake, small tortoise, or such like, in its claws; when, dashing it against the ground with great violence, if the victim were not killed at first, it repeated the operation till that end was answered; after which it ate it up quietly. Dr. J. R. Forster mentioned a further circumstance, which he says was supposed to be peculiar to this bird,—that should it by any accident break the leg, the bone would never unite again.

The curious reader will be interested by the following singular particulars respecting THE STORK.—The veneration shewn by the Germans for storks, is a very remarkable superstition. The houses which these birds light upon, are considered as under the special favour of Heaven. It is usual to contrive a small flat square spot on the top of the roof, for them to rest upon, and build their nests. Catholic curates, as well as Protestant ministers, endeavour to allure them to their churches. “I observed (says a French traveller) four or five steeples dignified by such visitors. There are people so lucky as to attract some of them into their poultry-yard, where they stalk about with the hens, but without yielding up any particle of their freedom. Were any one to kill a stork, he would be pursued like an Egyptian of old for killing an ibis, or for fricaseeing a cat.”

In a fire, by which the town of Delft in Holland was burnt to ashes, a stork, which had built her nest upon a chimney, strove all she could to save her little ones: she was seen spreading her wings around them, to keep off the sparks and burning embers. Already the flame began to seize upon her, but, unmindful of herself, she cared only for her offspring, bemoaning their loss, and at length fell a prey to the fire, under the eyes of a sympathizing crowd; preferring death with the pledges of her love, to life without them. This interesting anecdote was celebrated by a Flemish poet, who lived in 1503, in an effusion bearing the title of the “Stork of Delft; or, the Model of Maternal Love.”

THE GREAT PELICAN.—This bird is sometimes of the weight of twenty-five pounds, and of the width, between the extreme points of the wings, of fifteen feet; the skin, between the sides of the upper mandible, is extremely dilatable, reaching more than half a foot down the neck, and capable of con-

taining many quarts of water. The skin is often used by sailors for tobacco-pouches, and has been occasionally converted into ladies' elegant work bags. About the Caspian and Black seas, these birds are very numerous; and they are chiefly to be found in the warmer regions, inhabiting almost every country of Africa. They build in the small isles of lakes, far from the habitations of man. The nest is a foot and a half in diameter; and the female, if molested, will remove her eggs into the water till the cause of annoyance is removed, and then return them to her nest of reeds and grass. These birds, though living principally upon fish, often build in the midst of deserts, where that element is rarely to be found. They are extremely dexterous in diving for their prey, and, after having filled their pouch, will retire to some rock, and swallow what they have taken at their leisure. They are said to unite with other birds in the pursuit of fish. The pelicans dive, and drive the fish into the shallows; the cormorants assist by flapping their wings on the surface, and, forming a crescent, perpetually contracting, they at length accomplish their object, and compel vast numbers into creeks and shallows, where they gratify their voracity with perfect ease, and to the most astonishing excess.

Another curiosity is, THE BIRD OF PARADISE.—In natural history, a genus of birds of the order Picæ. Generic character: bill covered at the base with downy feathers; nostrils covered by the feathers; tail of ten feathers, two of them, in some species, very long; legs and feet very large and strong. These birds chiefly inhabit North Guinea, whence they emigrate in the dry season to the neighbouring islands. Their feathers are used in these countries as ornaments for the head-dress; and the Japanese, Chinese, and Persians, import them for the same purpose. The rich and great among the latter attach these brilliant collections of plumage, not only to their own turbans, but to the housings and harnesses of their horses. They are found only within a few degrees of the equator. Gmelin enumerates twelve species, and Latham eight. *P. apoda*, or the greater Paradise bird, is about as large as a thrush. They pass in companies of thirty or forty together, headed by one whose flight is higher than that of the rest. They are often distressed by means of their long feathers, in sudden shiftings of the wind, and unable to proceed in their flight; are easily taken by the natives, who catch them with bird-lime, and shoot them with blunted arrows. They are sold at Aroo for an iron nail each, and at Banda for half a rix-dollar. Their food is not ascertained, and they cannot be kept alive in confinement. The smaller bird of Paradise is supposed, by Latham, to be a mere variety of the above. It is found only

In the Papuan islands, where it is caught by the natives often by the hand, and exenterated and seared with a hot iron in the inside, and then put into the hollow of a bamboo, to secure its plumage from injury.

The following account of the curiosities of THE OSTRICH, is taken from Lichtenstein's Travels in South Africa, vol. II.—“The habits of the ostrich are so remarkable, and have been so imperfectly described by travellers in general, that I cannot forbear bringing together here all the knowledge I acquired upon the subject, both in this and subsequent journeys. I have noticed, on a former occasion, a large flock of ostriches, which we met in the neighbourhood of Komberg. In that country, the drought and heat sometimes compel these gigantic birds to leave the plains, and then they pursue their course together in large flocks to the heights, where they find themselves more commodiously lodged. At the time of sitting, there are seldom more than four or five seen together, of which only one is a cock, the rest are hens. These hens lay their eggs all together in the same nest, which is nothing more than a round cavity made in the clay, of such a size as to be covered by one of the birds, when sitting upon it. A sort of wall is scraped up round with their feet, against which the eggs in the outermost circle rest. Every egg stands upon its point in the nest, that the greatest possible number may be stowed within the space. When ten or twelve eggs are laid, they begin to sit, the hens taking their turns, and relieving each other during the day; at night the cock alone sits, to guard the eggs against the jackals and wild cats, who will run almost any risk to procure them. Great numbers of these smaller beasts of prey have often been found crushed to death about the nests; a proof that the ostrich does not fight with them, but knows very well how to conquer them at once by her own resistless power; for it is certain, that a stroke of her large foot trampling upon them, is enough to crush any such animal.

“The hens continue to lay during the time they are sitting, and that, not only till the nest is full, which happens when about thirty eggs are laid, but for some time after. The eggs laid after the nest is filled are deposited round about it, and seem designed by nature to satisfy the cravings of the above-mentioned enemies, since they very much prefer the new-laid eggs to those which have been brooded. But they seem also to have a more important designation, that is, to assist in the nourishment of the young birds. These, when first hatched, are as large as a common pullet, and since their tender stomachs cannot digest the hard food eaten by the old ones, the spare eggs serve as their first nourishment. The increase of

the ostrich race would be incalculable, had they not so many enemies, by which great numbers of the young are destroyed after they quit the nest.

"The ostrich is a very prudent, wary creature, which is not easily ensnared in the open field, since it sees to a very great distance, and takes to flight upon the least idea of danger. For this reason the quaggas generally attach themselves, as it were instinctively, to a troop of ostriches, and fly with them, without the least idea that they are followed. Xenophon relates, that the army of Cyrus met ostriches and wild asses together, in the plains of Syria.

"The ostriches are particularly careful to conceal, if possible, the places where their nests are made. They never go directly to them, but run round in a circle at a considerable distance before they attempt to approach the spot. On the contrary, they always run directly up to the springs where they drink, and the impressions they make on the ground, in the desolate places they inhabit, are often mistaken for the footsteps of men. The females, in sitting, when they are to relieve each other, either both remove awhile to a distance from the nest, or change hastily, that any one who might by chance be spying about, could never see both at once. In the day-time, they occasionally quit the nest entirely, and leave the care of warming the eggs to the sun alone. If at any time they find that the place of their nest is discovered, that either a man or a beast of prey has been at it, and has disturbed the arrangement of the eggs, or taken any away, they immediately destroy the nest themselves, break all the eggs to pieces, and seek out some other spot to make a new one. When the colonist therefore finds a nest, he contents himself with taking one or two of the spare eggs that are lying near, observing carefully to smooth over any footsteps which may have been made, so that they may not be perceived by the birds. Thus visits to the nest may be often repeated, and it may be converted into a storehouse of very pleasant food, where, every two or three days, as many eggs may be procured as are wanted to regale the whole household.

"An ostrich's egg weighs commonly near three pounds, and is considered as equal in its square contents to twenty-four hen's eggs. The yolk has a very pleasant flavour, yet, it must be owned, not the delicacy of a hen's egg. It is so nourishing and so soon satisfies, that no one can eat a great deal at once. Four very hungry persons would be requisite to eat a whole ostrich's egg; and eight Africans, who are used to so much harder living, might make a meal of it. These eggs will keep for a very long time: they are often brought to the Cape Town, where they are sold at the price of half a dollar each.

“ In the summer months of July, August, and September, the greatest number of ostriches’ nests are to be found; but the feathers, which are always scattered about the nest at the time of sitting, are of very little value. I have, however, at all times of the year, found nests with eggs that have been brooded: the contrasts of the seasons being much less forcible in this part of the world than in Europe, the habits of animals are consequently much less fixed and regular. The ostrich sits from thirty-six to forty days before the young are hatched.

“ It is well known that the male alone furnishes the beautiful white feathers which have for so long a time been a favourite ornament in the head-dress of our European ladies. They are purchased from the people who collect them, for as high as three or four shillings each; they are, however, given at a lower price, in exchange for European wares and clothing. Almost all the colonists upon the borders have a little magazine of these feathers laid by, and when they would make a friendly present to a guest, it is generally an ostrich’s feather. Few of them are, however, prepared in such a manner as to be wholly fit for the use of the European dealers. The female ostriches are entirely black, or rather, in their youth, of a very dark gray, but have no white feathers in the tail. In every other respect, the colour excepted, their feathers are as good as those of the males. It is very true, as Mr. Barrow says, that small stones are sometimes found in the ostrich’s eggs; it is not, however, very common; and, among all that I ever saw opened, I never met with one.”

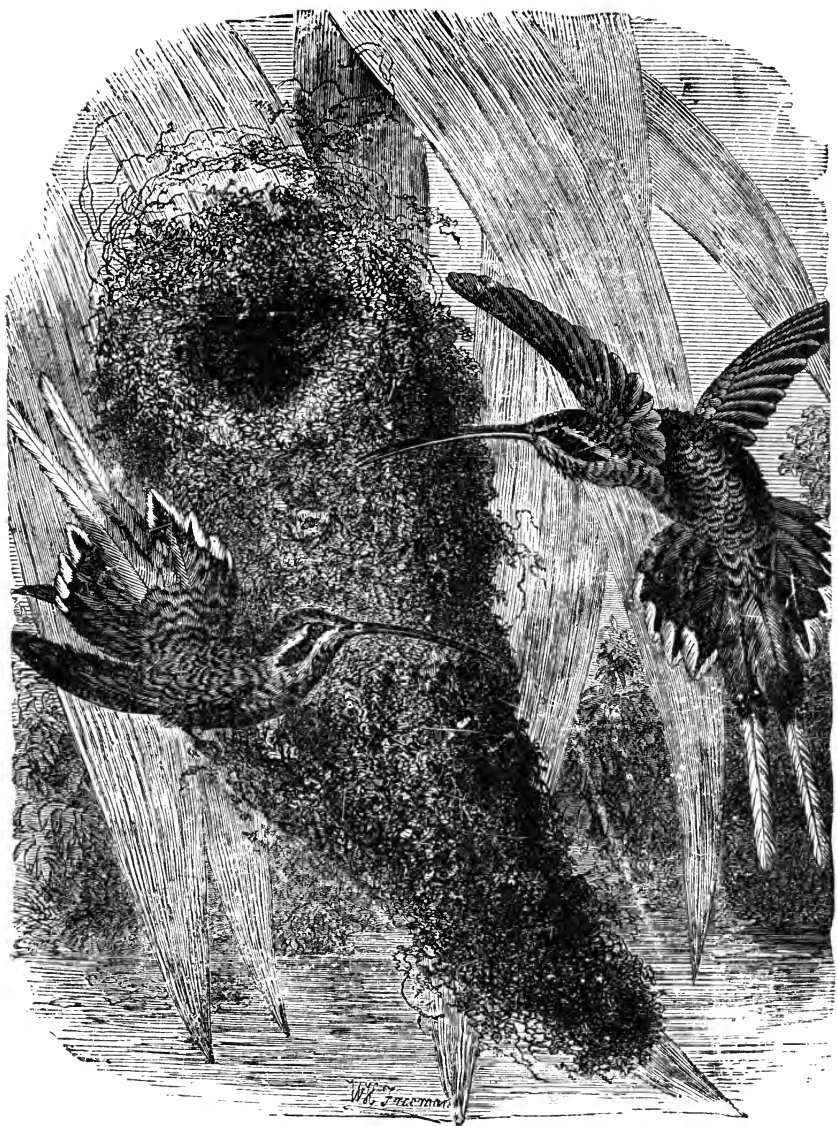
We must not omit to give some account of THE MOCKING-BIRD OF AMERICA.—Those who have not heard the mocking-bird, can have no conception of his great superiority of song: he seems the merryandrew among birds, and the most serious and laboured efforts of the best performers appear to him only sport: he performs an antic dance to the sound of his own music; like jack-pudding, too, he seems to make game of his audience, for often, when he has secured the attention by the most delightful warblings, he will stop suddenly, and surprise them by the quack of a duck, the hiss of a goose, the monstrous note of the whip-poor-will, or any other unexpected sound: he possesses also the power of a ventriloquist, in being able to deceive his hearers as to the direction of the sound. When he is not seen, and while his listeners are looking for the enchanter on the roof of their own houses, he is perhaps playing his antic tricks on the chimney-top of some house at a considerable distance. When, however, there are no spectators during the stillness of night, he lays aside his frolic, and pours his “love-laboured songs;” and surely, if

there is fascination in sweet sounds, it must be in the song of this delightful bird, perched on the chimney-top, or on some tree near to the dwelling of man. He seems never to tire.

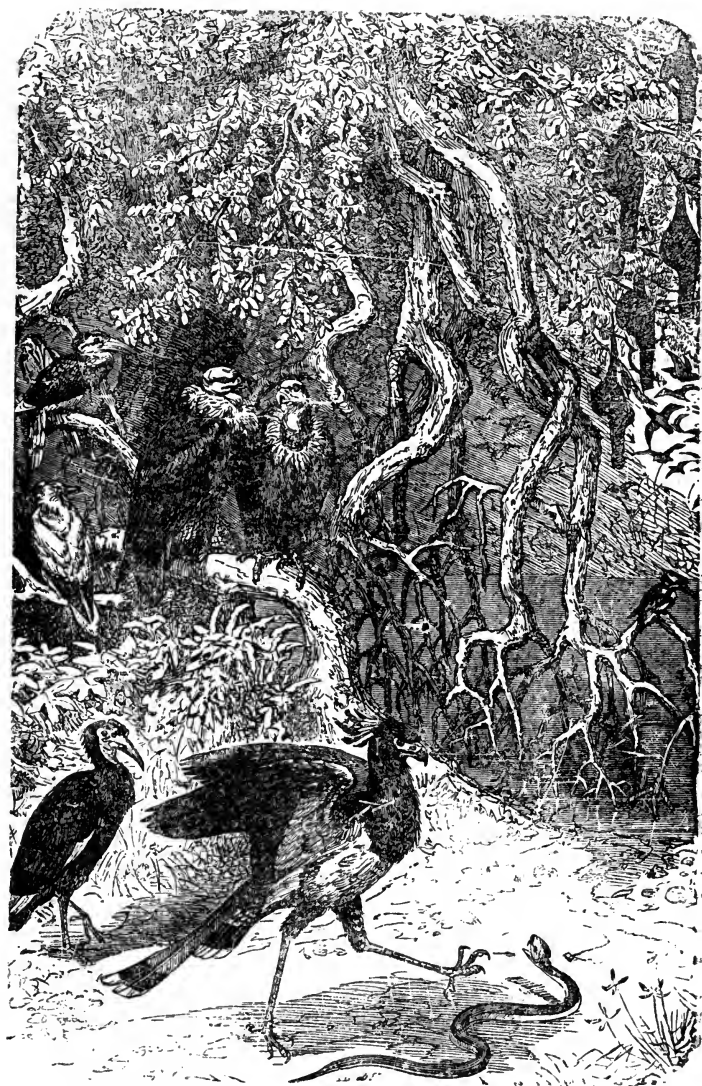
The next subject of curiosity is **THE SOCIAL GROSBEAK**.—This bird inhabits the interior country of the Cape of Good Hope, where it was discovered by Mr. Paterson. These birds live together in large societies, and their mode of nidification is extremely uncommon. They build in a species of mimosa, which grows to an uncommon size, and which they seem to select for that purpose, as well on account of its ample head, and the great strength of its branches, calculated to admit and to support the extensive buildings which they have to erect, as for the tallness and smoothness of its trunk, which their great enemies, the serpent tribe, are unable to climb.

The method in which the nests themselves are fabricated, is highly curious. In the one described by Mr. Paterson, there could be no less a number (he says) than from eight hundred to a thousand, residing under the same roof. He calls it a roof, because it perfectly resembles that of a thatched house; and the ridge forms an angle so acute and so smooth, projecting over the entrance of the nest below, that it is impossible for any reptile to approach them. The industry of these birds is almost equal, in his opinion, to that of the bee: throughout the day they appear to be busily employed in carrying a fine species of grass, which is the principal material they employ for the purpose of erecting this extraordinary work, as well as for additions and repairs.—“Though my short stay in the country was not sufficient to satisfy me, by ocular proof, that they added to their nest as they annually increased in numbers, still, from the many trees which I have seen borne down with the weight, and others which I have observed with their boughs completely covered over, it would appear, that this is really the case; when the tree, which is the support of this aerial city, is obliged to give way to the increase of weight, it is obvious they are no longer protected, and are under the necessity of building in other trees.

“One of these deserted nests I had the curiosity to break down, so as to inform myself of the internal structure of it, and found it equally ingenious with that of the external. There many entrances, each of which forms a regular street, with nests on both sides, at about two inches distant from each other. The grass with which they build, is called, the Boshman's grass; and I believe the seed of it to be their principal food; though, on examining their nests, I found the wings and legs of different insects. From every appearance, the nest which I dissected had been inhabited for many years; and some parts of it were much more complete than others:



HUMMING BIRDS



BIRDS IN THE TROPICS.

this therefore I conceive nearly to amount to a proof, that the animals added to it at different times, as they found necessary from the increase of the family, or rather of the nation or community.

THE BENGAL GROSBEAK.—This is an Indian bird, and is thus described by Mr. Latham. “This little bird (called *bayà*, in Hindu; *berbera*, in Sanscrit; *bábûi*, in the dialect of Bengal; *cîbû*, in Persian; and *tenauwit*, in Arabic, from its remarkably pendent nest) is rather larger than a sparrow, with yellow brown plumage, a yellowish head and feet, a light coloured breast, and a conic beak, very thick in proportion to his body. This bird is exceedingly common in Hindostan; he is astonishingly sensible, faithful, and docile, never voluntarily deserting the place where his young were hatched, but not averse, like most other birds, to the society of mankind, and easily taught to perch on the hand of his master. In a state of nature, he generally builds his nest on the highest tree that he can find, especially on the palmyra, or on the Indian fig-tree, and he prefers that which happens to overhang a well or rivulet: he makes it of grass, which he weaves like cloth, and shapes like a large bottle, suspending it firmly on the branches, but so as to rock with the wind, and placing it with its entrance downwards, to secure it from birds of prey. His nest usually consists of two or three chambers; and it is the popular belief that he lights them with fire-flies, which he catches alive at night, and confines with moist clay or cow-dung. That such flies are often found in his nest, where pieces of cow-dung are also stuck, is indubitable: but as their light could be of little use to him, it seems probable that he only feeds on them. He may be taught with ease to fetch any small thing that his master points out to him: it is an attested fact, that if a ring be dropped into a deep well, and a signal be given to him, he will fly down with amazing celerity, catch the ring before it touches the water, and bring it up with apparent exultation; and it is asserted, that if a house or any other place be shewn to him once or twice, he will carry a note thither immediately on a proper signal.

“One instance of his docility, I can myself mention with confidence, having often been an eye-witness of it. The young Hindoo women at Benares, and in other places, wear very thin plates of gold, called *ticas*, slightly fixed by way of ornament between their eye-brows; and when they pass through the streets, it is not uncommon for the youthful libertines, who amuse themselves with training bayas, to give them a signal, which they understand, and send them to pluck the pieces of gold from the foreheads of their mistresses, which they bring in triumph to the lovers. The baya feeds naturally

on grasshoppers and other insects, but will subsist, when tame, on pulse macerated in water: his flesh is warm and drying, and easy of digestion. The female lays many beautiful eggs, resembling large pearls; the white of them, when boiled, is transparent, and the flavour is exquisitely delicate. When many bayas are assembled on a high tree, they make a lively din, but it is rather chirping than singing; their want of musical talents is, however, amply supplied by their wonderful sagacity, in which they are not excelled by any feathered inhabitant of the forest."

Another subject of acknowledged curiosity is, **THE HUMMING BIRD.**—There are sixty species enumerated by Latham, and Gmelin has sixty-five. The birds of this genus are the smallest of all birds. These diminutive creatures subsist on the juices of flowers, which they extract, like bees, while on the wing, fluttering over their delicate repast, and making a considerable humming sound, from which they derive their designation. They are gregarious, and build their nests with great neatness and elegance, lining them with the softest materials they can possibly procure.

The red-throated humming-bird is rather more than three inches long, and is frequent in various parts of North America. Its plumage is highly splendid and varying; it extracts the nectar of flowers, particularly those of a long tube, like the convolvulus or tulip. They will suffer themselves to be approached very near, but on observing an effort to seize them, dart off with the rapidity of an arrow. A flower is frequently the subject of bitter conflict between two of these birds; they will often enter an open window, and, after a short contest, retire. They sometimes soar perpendicularly to a considerable height, with a violent scream. If a flower which they enter furnishes them with no supply, they pluck it, as it were in punishment and revenge, from its stalk. They have been kept alive in cages for several weeks, but soon perish for want of the usual food, for which no adequate substitute has yet been found. Latham, however, mentions a curious circumstance of their being preserved alive by Captain Davies for four months, by the expedient of imitating tubular flowers with paper appropriately painted, and filling the bottom of the tubes with sugar and water as often as they were emptied. They then took their nourishment in the same manner as when unconfined, and soon appeared familiarized and happy. They build on the middle of the branch of a tree, and lay two eggs in an extremely small and admirably constructed nest.

The smallest of all the species is said, when just killed, to weigh no more than twenty grains. Its total length is an inch and a quarter. It is found in the West Indies and South Ame-

rica, and is exceeded both in weight and magnitude by several species of bees.

We shall close this chapter with an account of **THE GOLDEN EAGLE**.—This bird weighs above twelve pounds, and is about three feet long, the wings, when extended, measuring seven feet four inches. The sight and sense of smelling are very acute; the head and neck are clothed with narrow, sharp-pointed feathers, of a deep brown colour, bordered with tawny; the hind part of the head is of bright rust colour. These birds are very destructive to fawns, lambs, kids, and all kinds of game, particularly in the breeding season, when they bring a vast quantity of prey to their young. Smith, in his History of Kerry, relates, that a poor man in that country got a comfortable subsistence for his family, during a summer of famine, out of an eagle's nest, by robbing the eaglets of the food the old ones brought, whose attendance he protracted beyond the natural time, by clipping the wings and retarding the flight of the former. It is very unsafe to leave infants in places where eagles frequent; there having been instances in Scotland of two being carried off by them; but, fortunately, the thefts were discovered in time, and the children were restored unhurt out of the eagles' nests. In order to extirpate these pernicious birds, there is a law in the Orkney isles, which entitles every person that kills an eagle to a hen out of every house in the parish where it was killed. Eagles seem to give the preference to the carcasses of dogs and cats. People who make it their business to kill those birds, lay one of these carcasses by way of bait; and then conceal themselves within gun-shot. They fire the instant the eagle alights; for she that moment looks about before she begins to prey. Yet, quick as her sight may be, her sense of hearing seems still more exquisite. If hooded crows or ravens happen to be nearer the carrion, and resort to it first, and give a single croak, the eagle instantly repairs to the spot. These eagles are remarkable for their longevity, and for sustaining a long abstinence from food. Mr. Keysler relates, that an eagle died at Vienna after a confinement of 104 years. This pre-eminent length of days is alluded to by the Psalmist, "Thy youth is renewed like the eagle's."

One of this species, which was nine years in the possession of Owen Holland, Esq. of Conway, lived thirty-two years with the gentleman who made him a present of it; but what its age was, when the latter received it from Ireland, is unknown. The same bird also furnishes us with a proof of the truth of the other remark; having once, through the neglect of servants, endured hunger for twenty-one days without any sustenance whatever.

Here it is proper to take notice of a very singular variety of the Golden Eagle, described by Mr. Bruce, in his Travels in Abyssinia; for, whether it properly belongs to this species or not, we do not find that it has been, as yet, either arranged under any other, or ranked as a different genus, (which indeed it appears to be,) by Mr. Kerr, or any other ornithologist. Mr. Bruce says, it is not only the largest of the eagle kind, but the largest bird that flies. By the natives it is vulgarly called *abon duchem*, or, father long-beard. It is not an object of any chase, nor stands in need of any stratagem to bring it within reach. Upon the highest top of mount Lamalmon, while Mr. Bruce's servants were refreshing themselves after their toilsome ascent, and enjoying the pleasure of a most delightful climate, eating their dinner in the open air, with several large dishes of boiled goat's flesh before them, this eagle suddenly made its appearance; he did not stoop rapidly from a height, but came flying slowly along the ground, and sat down close to the meat, within the ring the men had made around it. A great shout, or rather cry of distress, which they raised, made the bird stand for a minute as if to recollect himself; but while the servants ran for their lances and shields, his attention was fully fixed upon the flesh. He put his foot into the pan, where was a large piece in water nearly boiling; but feeling the smart, he withdrew it, and forsook the piece which he held. There were two large pieces, a leg and a shoulder, lying on a wooden platter: into these he struck his claws, and carried them off, skimming slowly along the ground, as he had come, till he disappeared behind a cliff. But being observed, at his departure, to look wistfully at the large piece which remained in the warm water, it was concluded that he would soon return; in expectation of which, Mr. Bruce loaded a rifle gun with ball, and sat down close to the platter by the meat. It was not many minutes before he came; and a prodigious shout was raised by the attendants, "He is coming, he is coming!" enough to have discouraged a less courageous animal. Whether he was not quite so hungry as at his first visit, or suspecting something from Mr. Bruce's appearance, he made a small turn, and sat down about ten yards from him, the pan with the meat being between them. In this situation Mr. Bruce fired, and shot him with the ball through the middle of his body, about two inches below the wing, so that he lay down upon the grass without a single flutter. Upon laying hold of his monstrous carcase, our author was not a little surprised at seeing his hands covered and tinged with yellow dust. Upon turning him upon his belly, and examining the feathers of his back, they produced a brown dust, the colour of the feathers there. The dust was not in small quantities, for, upon striking his breast, the yellow powder flew in a greater quantity than

from a hair-dresser's powder-puff. The feathers of the belly and breast, which were of a gold colour, did not appear to have any thing extraordinary in their formation, but the large feathers in the shoulders and wings seemed apparently to be fine tubes, which, upon pressure, scattered the brown dust upon the finer part of the feathers. Upon the side of the wing, the ribs, or hard part of the feather, seemed to be bare, as if worn, or, in our author's opinion, were rather renewing themselves, having before failed in their function. What the reason is of this extraordinary provision of nature, Mr. Bruce does not attempt to determine. But as it is an unusual one, it is probably meant, he thinks, for a defence against the climate in favour of those birds, which live in those almost inaccessible heights of a country, doomed even in its lower parts to several months' of excessive rain.

This bird, from wing to wing, was eight feet four inches; and from the tip of his tail to the point of his beak, four feet seven inches. He was remarkably short in the legs, being only four inches from the foot to the junction of the leg with the thigh; and from that to the body six inches. The thickness of his thigh was little less than four inches; it was extremely muscular, and covered with flesh. His middle claw was about two inches and a half long, not very sharp at the point, but extremely strong. From the root of the bill to the point was three inches and a quarter, and one inch and three-quarters in breadth at the root. A forked brush of strong hair, divided at the point into two, proceeded from the cavity of his lower jaw at the beginning of his throat. His eye was remarkably small in proportion to his bulk, the aperture being scarcely half an inch. The crown of his head, and the front, where the bill and skull joined, were bald.

CHAP. XX

CURIOSITIES RESPECTING BIRDS.—(Continued.)

The Cuckoo—The Cormorant—The Great Bustard—The Alarm-Bird—The Carrier, or Courier, Pigeon—The Wild Pigeon, its multiplying Power—Singular Bird, inhabiting a Volcano in Guadaloupe—Curious Adventure of an Owl—Curious Facts in Natural History—The Chick in the Egg.

THE CUCKOO.—We shall introduce this curious bird, with the following well-known beautiful piece of poetry :—

HAIL, beauteous stranger of the wood,
Attendant on the spring!
Now heav'n repairs thy rural seat,
And woods thy welcome sing.

Soon as the daisy decks the green,
Thy certain voice we hear:
Hast thou a star to guide thy path,
Or mark the rolling year?

Delightful visitant! with thee
I hail the time of flow'rs,
When heaven is fill'd with music sweet
Of birds among the bow'rs.

The school-boy, wand'ring in the wood,
To pull the flow'rs so gay,
Starts, thy curious voice to hear,
And imitates thy lay.

Soon as the pea puts on the bloom,
Thou fly'st thy vocal vale,
An annual guest, in other lands,
Another spring to hail.

Sweet bird! thy bow'r is ever green,
Thy sky is ever clear;
Thou hast no sorrow in thy song,
No winter in thy year!

O could I fly, I'd fly with thee;
We'd make, with social wing
Our annual visit o'er the globe,
Companions of the spring

This bird is described, in natural history, as a genus of the order of Picæ. Generic character: bill smooth, somewhat bending and weak; nostrils surrounded by a small rim; tongue short and arrowed; toes, two forward and two backward; tail wedge-formed, of ten soft feathers. Gmelin enumerates fifty-

five species, and Latham forty-six. The following are the most general characteristics of the Cuckoo :—

This bird is about fourteen inches long. It is found in Europe, Asia, and Africa. Its food consists of insects and the larvæ of moths, but when domesticated, which it may be without much difficulty, it will eat bread, fruits, eggs, and even flesh. When fattened, it is said to be excellent for the table. It is in this country a bird of passage, appearing first about the middle of April, and cheering the vicinity of its habitation with that well-known note, with which so many exquisite ideas and feelings are associated. This note is used only by the male bird, and this is the intimation of love. It has been heard, (though very rarely,) like the song of the nightingale, in the middle of the night. About the close of June this note ceases, but the cuckoo remains in England till towards the end of September. It is imagined sometimes to continue in the country for the whole of the year, as it has occasionally been seen here so early as February. Cuckoos are supposed to winter in Africa, as they are seen twice a year in the island of Malta.

With the history of these birds have been blended much fable and superstition; their manners, however, are unquestionably very curious; and fable in this, as in many other cases, is in a great degree connected with fact. It is almost universally agreed by naturalists, that the cuckoo does not hatch its own eggs, but deposits them in the nest of some other bird. Buffon mentions the names of twenty birds, or more, on which the cuckoo passes this fraud. Those most frequently duped by it, however, in this manner, are the yellow-hammer, the water-wagtail, and the hedge-sparrow; and of these three, by far more than the other two, the hedge-sparrow. The most minute and attentive examiner into this extraordinary peculiarity, is Mr. Edward Jenner; from whose observations on this interesting subject we shall select a few of the most important.

He states, that the hedge-sparrow is generally four or five days in completing her number of eggs, during which time the cuckoo finds an opportunity of introducing one of its own into the nest, leaving the future management of it to the hedge-sparrow; and that, though it frequently occurs that the latter is much discomposed by this intrusion, and several of the eggs are injured by her, and obliged to be removed from the nest, yet the egg of the cuckoo is never of this number. When the usual time of incubation is completed, and the young sparrows and cuckoo are disengaged from the eggs, the former are ejected from the nest, and the stranger obtains exclusive possession. A nest, built in a situation extremely convenient for minute observation, fell under the particular

examination of this gentleman, and was found on the first day to contain a cuckoo's and three hedge-sparrows' eggs. On the day following, he observed a young cuckoo and a hedge-sparrow, and as he could distinctly perceive every thing passing, he was resolved to watch the events which might take place. He soon, with extreme surprise, saw the young cuckoo, hatched only the day before, exerting itself with its rump and wings to take the young sparrow on its back, which it actually accomplished, and then climbed backwards with its burden to the verge of the nest, from which, with a sudden jerk, it clearly threw off its load; after which it dropped back into the nest, having first, however, felt about with the extremities of its wings, as if to ascertain whether the clearance were completely effected. Several eggs were afterwards put in to the young usurper, which were all similarly disposed of.—He observes, that in another instance, two cuckoos and a hedge-sparrow were hatched in the same nest, and one hedge-sparrow's egg remained unhatched. Within a few hours, a conflict began between the two cuckoos for the possession of the nest, which was conducted with extreme spirit and vigour, and in which each appeared occasionally to have the advantage, lifting its adversary to the very brink of the nest, and then, from exhaustion of strength, sinking with it again to the bottom. These vicissitudes of success were repeated and reiterated; but towards the close of the following day, the contest was decided by one of them, which was rather the larger of the two, completely expelling his rival; after which, the egg and the young hedge-sparrow were dislodged with extreme facility. The infant conqueror was brought up by the step-mother with the most assiduous affection. The sagacity of the female cuckoo appears not inconsiderable, in her introducing her egg into the nests of birds whose young are inferior in size and strength to the young cuckoo, and which the latter is consequently able to exclude without difficulty from its usurped dominions.

We shall now call the reader's attention to **THE CORMORANT**.—This bird, which is nearly as large as a goose, is found in many places both of the old and the new world; it is to be met with in the northern parts of this island, and one of them, not very long since, was shot while perched on the castle of Carlisle. These birds are shy and crafty, but frequently eat to so great an excess, as to induce a species of lethargy, in which they are caught by nets thrown over them without their making an effort to escape. They are trained by the Chinese to fish for them. By a ring placed round their necks, they are prevented from swallowing what they take, and, when their pouches are filled, they unload them, and

at the command of their owners, renew their diversings. Two will sometimes be seen combining their efforts to secure a fish too large for the management of one only. When their work is finished to the employer's satisfaction, the birds have a full allotment of the spoil, for their reward and encouragement. In Macao, also, these birds are thus domesticated, taking extreme delight in the exercise, and constituting a source of very considerable profit to their owners. They were formerly trained, and used in the same manner in England; and Charles I. had an officer of his household, called maste: of the cormorants.

The next curiosity among birds which we shall introduce, is, **THE GREAT BUSTARD**.—This bird is found in the plains of Europe, Asia, and Africa, but it has never been observed in the New Continent. In England, it is occasionally met with on Salisbury Plain, and on the wolds of Yorkshire, and formerly it was not uncommonly seen in flocks of forty or fifty. It is the largest of British land birds, weighing often twenty-five or thirty pounds. It runs with great rapidity, so as to escape the pursuit of common dogs, but falls speedily a victim to the greyhound, which often overtakes it before it has power to commence its flight, the preparation for which, in this bird, is slow and laborious. The female lays her eggs on the bare ground, never more than two in number, in a hole scratched by her for the purpose, and if these are touched or soiled during her occasional absence, she immediately abandons them. The male is distinguished by a large pouch, beginning under the tongue, and reaching to the breast, capable of holding, according to Linnæus, seven quarts of water. This is sometimes useful to the female during incubation, and to the young before they quit their nest; and it has been observed to be eminently advantageous to the male bird himself, who, on being attacked by birds of prey, has often discomfited his enemies by the sudden and violent discharge of water upon them. These birds are solitary and shy, and feed principally upon grasses, worms, and grain. They were formerly much hunted with dogs, and considered as supplying no uninteresting diversion. They swallow stones, pieces of metal, and other hard substances. Buffon states, that one was opened by the academicians of France, which contained in its stomach ninety doubloons, and various stones, all highly smoothed by the attrition of the stomach.

The following deserves to be ranked among the curiosities of the feathered tribe; **THE ALARM-BIRD**.—Near the Coppermine River, which falls into Hudson's Bay, live a tribe of Indians, who traverse the immense and dreary solitudes that

surround them, in pursuit of deer or other game, from which they derive their only subsistence. The animals, however, taught by experience to shun the haunts of men, and instinctively led to conceal themselves in the most sequestered spots, would with difficulty be discovered, were it not for one of the winged tribe of the owl genus, called the alarm-bird.

No sooner does this bird descry man or beast, than it directs its flight towards them, and, hovering over them, forms gyrations round their head. Should two objects at once arrest its attention, it flies from one to the other alternately, with a loud screaming, resembling the crying of a child; and in this manner it will follow travellers, or attend a herd of deer, for the space of a day.

By means of this guide, whose qualities so well correspond with its name, the Copper Indians are apprised of the approach of strangers, or directed to the herds of deer and musk-oxen, which otherwise they would frequently miss. Is it to be wondered at, then, that they hold the alarm-bird in the highest veneration? It seems, indeed, to have been intended by Providence for the solace and friend of the miserable inhabitants of those wild and sterile regions; and will furnish a new evidence of that superintending care which watches over all.

The *Cuculus Indicator*, so celebrated in the warmer climates for detecting the treasures of the bees, in the deep recesses of the woods, within the hollow trunks of trees, has, or may be thought to have, a view and an object in its services. It feels the want of human assistance, to enable it to enjoy the fruits of its discoveries, and therefore instinctively calls for it, in hopes of being recompensed with a share of the honey, which, we are told, the natives readily allow it; but the alarm-bird appears perfectly disinterested in its labours, it answers no purpose of its own, and therefore may be considered as one of the bounties of Heaven, to a people and a country almost shut out from the participation of the common blessings of life. It confers benefits without the prospect of a reward; and, for this reason, is entitled to the greater regard.

To contemplate the various animals that are dispersed over the globe, and the various blessings and advantages of different climates, will naturally lead us to the Source and Dispenser of all; and though some parts of the works of Creation are more conspicuously beneficial, and cannot escape the most common observer, yet we may, from analogy and reason, conceive that nothing was made in vain.

A subject of great curiosity, and pleasing admiration, is, **THE CARRIER, OR, COURIER PIGEON.**—These birds, though

carried, hoodwinked, twenty, thirty, or even a hundred miles, will find their way in a very little time to the place where they were bred. They are trained to this service in Turkey and Persia; and are carried first, while young, short flights of half a mile, afterwards more, till at length they will return from the farthest part of the kingdom. Every bashaw has a basket of these pigeons bred in the seraglio, which from a distance, upon any emergent occasion, (as an insurrection, or the like,) he dispatches, with letters braced under their wings, to the seraglio; which proves a more speedy method, as well as a more safe one, than any other: he sends out more than one pigeon, however, for fear of accidents. Lithgow assures us, that one of these birds will carry a letter from Babylon to Aleppo, which is thirty days' journey, in forty-eight hours. This practice is very ancient: Hirtius and Brutus, at the siege of Modena, held a correspondence by pigeons; and Ovid tells us, that Taurosthenes, by a pigeon stained with purple, gave notice to his father of his victory at the Olympic games, sending it to him at Ægina. In modern times, the most noted were the pigeons of Aleppo, which served as couriers at Alexandretta and Bagdad. But this use of them has been laid aside for the last thirty or forty years, because the Curd robbers killed the pigeons. The manner of sending advice by them, was this: they took pairs which had young ones, and carried them on horseback to the place whence they wished them to return, taking care to let them have a full view. When the news arrived, the correspondent tied a billet to the pigeon's foot, and let her loose. The bird, impatient to see its young, flew off like lightning, and arrived at Aleppo in ten hours from Alexandretta, and in two days from Bagdad. It was easy for them to find their way back, as Aleppo may be discovered at an immense distance. This pigeon has nothing peculiar in its form, except its nostrils, which, instead of being smooth and even, are swelled and rough.

It is presumed it will not be out of place to insert the following curious particulars respecting the **MULTIPLYING POWER OF THE WILD PIGEON.**—The following account is extracted from Janson's *Stranger in America*. Mr. Richard Hazen, a land-surveyor, who, in 1741, drew the line which divides Massachusetts from Vermont, gives an interesting account of the multiplying power of nature in the wild pigeon. "For three miles together, (says he,) the pigeons' nests were so thick, that five hundred might be reckoned on beech-trees at one time, and, could they have been counted on the hemlocks as well, he did not doubt that five thousand might be seen at one turn round. Twenty-five nests were frequently found in one beech-tree, in New England. The earth was

covered with these trees and with hemlocks, thus loaded with the nests of pigeons. For one hundred acres together, the ground was covered with their dung, to the depth of two inches. Their noise in the evening was extremely troublesome, and so great, that the traveller could not get any sleep where men nests abounded. About an hour before sun-rise they rose in such quantities as to darken the air. When the young pigeons were grown to a proper size, it was common for the first settlers to cut down the trees, and gather a horse-load in a few minutes. The markets at this season, even at Philadelphia, are often overstocked with them; a score of them have lately been purchased for sixpence. But as the land becomes settled, they retire into the back forests, where they are at this day in equal numbers! In North Carolina, wild pigeons or doves pass over the country in such numbers as to darken the air, devouring all kinds of grain in their progress. A large musket, loaded with small shot, fired among them, has killed scores; and boys knock them down with sticks and stones. I did not see this destructive phenomenon; but was credibly informed at Edenton, that it occurs once in seven, and sometimes in ten years. During my residence in that state, I cut holes in the top of my barn, and, by placing food on the roof, soon enticed about half a dozen from the adjacent woods. In a short time they became domesticated, and fed with the fowl, affording a constant and an agreeable food. When I left my residence, they had, notwithstanding the use I made of the young ones, increased to many scores. They grew so familiar, that they would watch my appearance in the morning, and perch upon me, in hopes of obtaining food, with which it was my practice to supply them. They distinguished me from my domestics, whom they would not suffer to approach them. They would permit me to go into their dovecot, without retreating; but the dam would often oppose my taking her young ones."

The following account of A SINGULAR BIRD INHABITING A VOLCANO IN GUADALOUPE, is taken from a respectable source.

Father Dutertre, in his Description of Guadaloupe, the best and most beautiful, in his opinion, of all the Leeward islands, speaks of an extraordinary bird which inhabits its volcanic mountain, called La Souffriere. This creature, called the Devil by the inhabitants, on account of its deformity, is both a night and sea bird. During the day, its vision appears to be indistinct, and it takes refuge near the top of the mountain, where it has its nest in the ground, and where it hatches its eggs. During the night, it flies about, and goes to prey on fish. Its flesh is so delicate, (adds Father Dutertre,) that no

hunter returns from the Souffriere without ardently desiring to have a dozen of these birds suspended at his neck. Labat, the colleague of Dutertre, confirms and adds to the account of the latter. "The bird called the Devil, of La Souffriere, has (he says) membranes at his feet like a duck, and claws like a bird of prey, a sharp and curved beak, large eyes, which cannot bear the light of day, or discern almost any object, so that when surprised in the day-time, at a distance from his nest, he runs against every thing in his way, and falls to the ground; but during the night he is active in extracting his prey from the sea." He adds, that "he is a bird of passage, and is considered a kind of petrel. I have taken pleasure in occasionally observing fishermen catch fish during the night by the light of a straw torch; but here we have a sea-bird of much greater ingenuity, which fishes by the light of a volcano, and hatches his eggs by the warmth of its sulphureous discharge."

The following story is recorded in history as a fact, under the title of A CURIOUS ADVENTURE OF AN OWL.

In a council held at Rome by Pope John XXIII. at the first session, happened the Adventure of the Owl.—"After the mass of the Holy Ghost, all being seated, and John sitting on his throne, suddenly a frightful owl came screaming out of his hole, and placed himself just before the pope, staring earnestly upon him. The arrival of this nocturnal bird in the day-time, caused many speculations: some took it for an ill omen, and were terrified; others smiled, and whispered to each other. As to the Pope, he blushed, was in a sweat, arose, and brake up the assembly. But at the next session, the owl took his place again, fixing his eyes upon John; who was more dismayed than before, and ordered the bird to be driven away. A pleasant sight it was, to behold the prelates occupied in hunting him, for he would not decamp! At last they killed him, as an incorrigible heretic, by throwing their canes at him."—*Jortin's Ecclesiastical History*, vol. v. p. 485, 486.

We shall next record some CURIOUS FACTS IN NATURAL HISTORY.—We often meet in our aviaries with what are called mule canary birds, that is, the offspring of the gray linnet and the canary. "In the country, where the domestic fowls are accustomed to wander to a considerable distance from the farm-yard, I believe it is no uncommon occurrence for a chicken to make its appearance, that is evidently the offspring of the partridge and common hen. Indeed, I am inclined to think that the breed between fowls of the same genus are oftener crossed than we are aware of."—*It is a common practice in the country, to set a hen, as it is*

called, with ducks' eggs; and the agony which she suffers, when she sees her young charge first take to their natural element, the water, has often been observed with sympathy. The following anecdote may be relied upon, as the circumstance was observed by a gentleman of science:—

A hen, which was employed to hatch some ducks' eggs in the neighbourhood of a dyer's mill, where there was a small pond, was observed to exhibit the usual symptoms of terror and alarm when the ducklings first took to the water; but by degrees she became quite reconciled to their habits, and was accustomed to enjoy herself, in great quietness, on the banks, while they gambled in the pool. For two or three years she uniformly brought out ducklings, and at last, as regularly led them to the water as their natural dam would have done.

In the course of time, however, she brought out a brood of chickens. These she immediately led to the side of the pool also; but, on finding they did not enter the water, she became quite uneasy, invited them close to it, made every motion for them to enter it, flew over the pond, and then called them to follow, but all to no purpose. When she found that nothing would entice them to enter the water, she actually seized upon one or two of them, and threw them into it; and, if she had not been prevented, it is believed she would have drowned her whole progeny. This shews how much the native habits, even of fowls, may be changed by circumstances; and proves, in some degree, the existence of memory without judgment in the feathered tribes.

Some years ago, a farmer in the lower district of Annandale, took it into his head to rob a wild duck of her eggs, and to place them under one of his tame ducks, that was sitting at that time. The young brood (twelve in number) came into the world at the usual period, but one only continued with her stepdame. This extraordinary bird, however, never perfectly acquired the habits or dispositions of her new sisterhood: she never would associate with the tame drakes, but every spring left the farm-yard, and proceeded to the wilds in quest of mates; and, what was remarkably singular, she seemed to have a malicious pleasure in leading them into a snare, and was at great pains to draw them into such situations as admitted of their being easily shot, or otherwise destroyed. She always hatched her young in a peat moss, at some distance from the house, but never failed to bring them to the farm-yard, as soon as they were able to follow her. When this duck was about four years old, the owner was visited by a kinsman from Fife, who was so much taken up with her, that he begged for, and obtained her, as a present. She was put into a cage, and by him conveyed to his house near Kin-

ross. She was kept in confinement for a night and a day; when seeming perfectly contented, she was let out into the yard, where she set about adjusting herself for some time; she then suddenly took wing, and in the course of a few hours was among her old companions in Annandale. She was a second time conveyed to Fife, and her wings clipped.

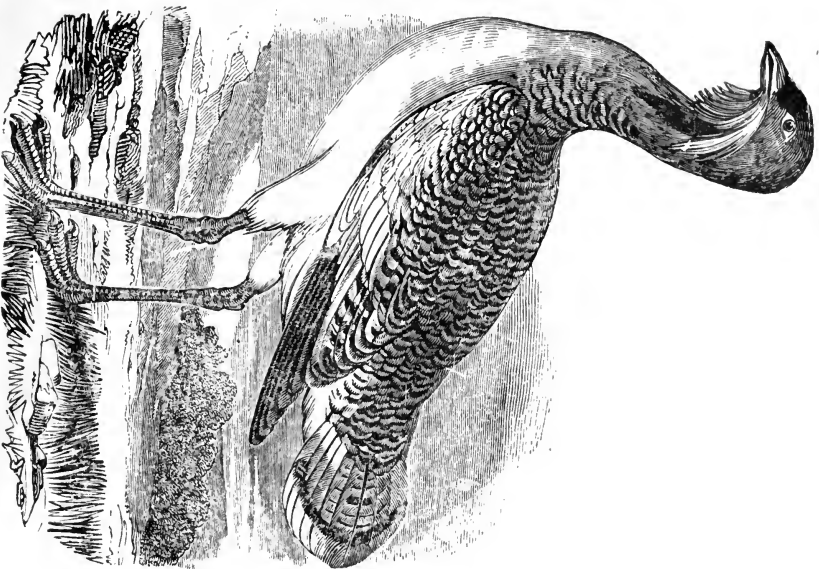
She continued perfectly happy, to appearance, till her feathers grew, when she again bade her new friends farewell. She was shot in the neighbourhood of Biggar, by a gentleman, who communicated the circumstance to the owner, whose name he learned from the collar that was found about her neck, containing his name and place of abode.

FORMATION OF THE CHICK IN THE EGG.—Scarcely has the hen sat upon the eggs twelve hours, before some lineaments of the head and body of the chick are discernible in the embryo; at the end of the second day, the heart begins to beat, but no blood is to be seen. In forty-eight hours we may distinguish two vesicles with blood, the pulsation of which is evident; one of them is the left ventricle, the other, the root of the great artery; soon after, one of the auricles of the heart is perceptible, in which pulsation may be remarked as well as in the ventricle. So early as the seventh hour, the wings may be distinguished, and on the head two globules for the brain, one for the beak, and two others for the front and hind part of the head. Towards the end of the fourth day, the two auricles, now distinctly visible, approach nearer the heart than they did before. About the fifth day the liver may be perceived; at the end of one hundred and thirty-eight hours, the lungs and stomach become visible; and in a few hours more, the intestines, veins, and upper jaw. On the seventh day, the brain begins to assume a more consistent form. One hundred and ninety hours after incubation, the beak opens, and flesh appears on the breast. In two hundred and ten, the ribs are formed, and the gall-bladder is visible. The bile, in a few hours more, is seen of a green colour; and if the chick be separated from its coverings, it will be seen to move. The feathers begin to shoot towards the two hundred and fortieth hour, and at the same time the skull becomes cartilaginous; in twenty-four hours more, the eyes appear; at the two hundred and eighty-eighth, the ribs are perfected; and at the three hundred and thirty-first, the lungs, the stomach, and the breast, assume their natural appearance. On the eighteenth day of incubation, the first faint piping of the chick is heard. It then continually increases in size and in strength till it emerges from its prison.

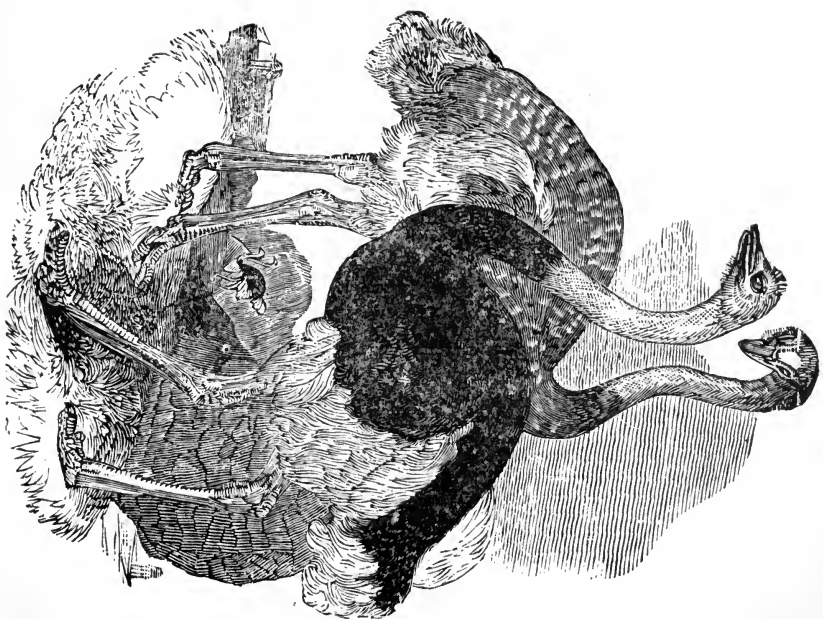
By so many different gradations does the adorable wisdom of God conduct these creatures into life; all their progressive

evolutions are arranged with order, and there are none without sufficient cause. If the liver is always formed on the fifth day, it is from the preceding state of the chick. No part of its body could appear sooner or later, without some injury to the embryo, and each of its members appears at the most convenient moment. The wise and invariable order in the production of this little body, is evidently the work of supernal power; and we shall be more convinced of it, if we consider the manner in which the chick is formed from the parts which compose the egg.

How admirable is that principle of life, the source of a new being, contained in the egg; all the parts of the animal being invisible till they become developed by warmth! What a wonderful order and regularity is observed in this amazing process,—the same evolutions taking place at once in twenty eggs! Neither does changing the position of the egg at all injure the embryo, or retard the formation of the chick; which, at the time when it breaks the shell, is found to be heavier than the whole egg was at first. These, however admirable, are far from being all the wonders displayed in the progress of incubation. The microscope, and the penetrating investigations of the curious, have only discovered what comes more immediately under the observation of our senses; whilst the discovery of many things remains for those who are to follow us, or perhaps they may never be known in this state of our existence. Much might be asked concerning the mystery connected with the formation of animal bodies, which at present is impenetrable to our researches; but let not this discourage us; let us only endeavour to improve, and make a good use of, the little knowledge we are permitted to acquire, and we shall have a sufficiency to discover at every step the wisdom and power of God, and enough to employ for the benefit of our fellow-creatures.



THE GREAT BUSTARD
Found in Europe, Asia, and Africa, but in no part of the
New World.



OSTRICHES OF SOUTH AFRICA.
They are so fleet as easily to distance the swiftest horse.



INDIAN BIRD'S NEST.

CHAP. XXI

CURIOSITIES RESPECTING BIRDS.—(*Concluded.*)*Birds' Nests—Migration of Birds—Curious Method of Bird-Catching in the Faro Isles—Song of Birds.*

BIRDS' NESTS

It wins my admiration,
 To view the structure of that little work,
 A bird's nest: mark it well within, without;
 No tool had he that wrought, no knife to cut,
 No nail to fix, no bodkin to insert,
 No glue to join! his little beak was all;
 And yet how neatly finish'd!

Hun dis.

THE structure of Bird's Nests discovers to us many curious objects, which cannot be uninteresting to the reflecting mind. And who does not admire those little regular edifices composed of so many different materials, collected and arranged with so much pains and skill, and constructed with so much industry, elegance, and neatness, with no other tools than a bill and two feet? That men can erect great buildings according to certain rules of art, is not surprising, when we consider that they enjoy the reasoning faculty, and that they possess tools and instruments of various kinds, to facilitate their work; but that a delicate little bird, in want of almost every thing necessary for such an undertaking, with only its bill and claws, should know how to combine so much skill, regularity of form, and solidity of composition, in constructing its nest, is truly wonderful, and never enough to be admired. We shall therefore consider it more minutely.

Nothing is more curious than the nest of a goldfinch or a chaffinch. The inside of it is lined with cotton, wool, and fine silky threads, while the outside is interwoven with thick moss; and that the nest may be less remarkable, and less exposed to the eye of observers, the colour of the moss resembles that of the bark of the tree, or of the hedge, where the nest is built. In some nests, the hair, the down, and the straws, are curiously laid across each other, and interwoven together. There are others, all the parts of which are neatly joined and fastened together by a thread which the bird makes of flax, horse or cow hair, and often of spiders' webs. Other birds, as the blackbird and the lapwing, after having constructed their nest, plaster the outside with a thin coating of mortar, which cements and binds together all the lower parts, and which, with the help of some cow-hair or moss, stuck to

it whilst the plaster is wet, keeps it compact and warm. The nests of swallows are differently constructed from the rest. They use neither sticks, straws, nor strings; but they compose a sort of cement, with which they make themselves nests, perfectly neat, secure, and convenient. To moisten the dust of which they form their nests, they frequently skim over the surface of some lake or river, and, dipping their breasts into the water, shake their wet feathers upon the dust till it is sufficiently moist, and then knead it up into a kind of clay with their bills.

But the nests most worthy of our admiration are those of certain Indian birds, which suspend them with great art from the branches of trees, that they may be secure from the pursuit of several animals and insects. In general, each species of bird has a peculiar mode of fixing its nest; some build them on houses, others in trees, some in the grass, others on the ground, and always in that way which is most adapted for the rearing of their young, and the preservation of their species. Such, therefore, is the wonderful instinct of birds, even in the structure and disposition of their nests alone, that we may safely conclude they cannot be mere machines. But is it not also apparent, that in all their works they propose to themselves certain ends? They construct their nests hollow, forming the half of a sphere, that the heat may be more concentric. The nest is covered without by substances more or less coarse, not only to serve as a foundation, but to prevent the wind and insects from entering. Within, it is lined with the most delicate materials, such as wool and feathers, that the nestlings may be soft and warm. Is it not something nearly approaching to reason, which teaches the bird to place its nest in such a manner as to be sheltered from rain, and out of the reach of destructive animals? Where have they learned that they are to produce eggs, which will require a nest to prevent them from being broken, and to keep them in the necessary temperature? that the heat would not be sufficiently concentrated if the nest were larger; and that, if it were smaller, all the young ones could not be contained in it? Who has taught them not to mistake the time, but to calculate so exactly, that the eggs are not laid before the nest is finished? These questions have never been satisfactorily answered, neither can this mystery in nature be clearly explained; all we can do is, to refer it to an instinct, which some animals seem to possess in a manner almost equal to reason: and instinct to them is much more happy and beneficial than reason would be; for they seem to enjoy all the sweets of life without their moments being embittered by the consideration of their inferior rank in the creation, and without the pain of anticipating evil.

The following account is principally abridged from that very interesting work, *The Contemplative Philosopher*. The present compiler acknowledges his obligations to that work on many occasions, and gives it his warmest recommendations to the public.

MIGRATION OF BIRDS.—The migration of birds has been justly considered as one of the most wonderful exhibitions of nature. This migration, which is common to the quail, the stork, the crane, the fieldfare, the woodcock, the cuckoo, the martin, the swallow, and various others, is, indeed, a very curious article in natural history, and furnishes a very striking instance of a powerful instinct impressed by the Creator. Dr. Derham observes two circumstances remarkable in this migration: the first, that these untaught, unthinking creatures, should know the proper times for their passage, when to come and when to go; as also, that some should come when others retire. No doubt, the temperature of the air as to heat and cold, and their natural propensity to breed their young, are the great incentives to these creatures to change their habitations. But why should they at all change their habitations? And why is some certain place to be found, in all the terraqueous globe, that, all the year round, can afford them convenient food and habitation?—The second remarkable circumstance is, that they should know which way to steer their course, and whither to go. What instinct is it that can induce a poor foolish bird to venture over vast tracts of land and sea. If it be said, that by their high ascents into the air, they can see across the seas; yet what shall instruct or persuade them, that another land is more proper for their purpose than this? that Great Britain, for instance, should afford them better accommodation than Egypt, the Canaries, Spain, or any of the other intermediate countries?—*Physico-Theology*, book vii. chap. 3.

Birds of passage, moreover, are all peculiarly accommodated, by the structure of their parts, for long flights; and it is remarked, that in their migrations, they observe a wonderful order and polity: they fly in troops, and steer their course without the aid of a compass, to vast unknown regions. The flight of the wild geese, in a wedge-like figure, has been often observed; to which it is added, by the natural historian of Norway, that the three foremost, who are the soonest tired, retreat behind, and are relieved by others, who are again succeeded by the rest in order. But this circumstance has been observed, many ages before, by Pliny, who describes certain birds of passage flying in the form of a wedge, and spreading wider and wider; those behind resting upon those before, till the leaders being tired, are, in their turn, received into the rear.

"Wild ducks and cranes (says Abbé de la Pluche) fly, at the approach of winter, in quest of more favourable climates. They all assemble at a certain day, like swallows and quails. They decamp at the same time, and it is very agreeable to observe their flight. They generally range themselves in a long column like an I, or in two lines united in a point like a > reversed." And thus, as Milton says

"Rang'd in figure, wedge the way."

"The duck or quail that forms the point (adds the Abbé) cuts the air, and facilitates a passage to those that follow: but he is charged with this commission only for a certain time, at the conclusion of which he wheels into the rear, and another takes his post." And thus again, as Milton says,

"——— With mutual wing
Easing their flight."

It has been observed of the storks, that for about the space of a fortnight before they pass from one country to another, they constantly resort together, from all the circumjacent parts, to a certain plain, and there forming themselves once every day into a *dou-wanne*, (according to the phrase of the people,) are said to determine the exact time of their departure, and the places of their future abode.

Mr. Biberg, an ingenious naturalist of Sweden, has observed, that "the starling, finding, after the middle of summer, that worms are less plentiful in that country, goes annually into Scania, Germany, and Denmark. The female chaffinches, every winter, about Michaelmas, go in flocks to Holland; but as the males stay in Sweden, the females come back next spring. In the same manner, the female Carolina yellowhammer, in the month of September, while the rice on which she feeds is laid up in granaries, goes towards the south, and returns in the spring to seek her mate. Our aquatic birds (continues he) are forced by necessity to fly toward the south every autumn, before the water is frozen. Thus we know, that the lakes of Poland and Lithuania are filled with swans and geese every autumn, at which time they go in great flocks, along many rivers, as far as the Euxine Sea. But in the beginning of spring, as soon as the heat of the sun molests them, they return back, and go again to the northern ponds and lakes, in order to lay their eggs. For there, and especially in Lapland, there is a vast abundance of gnats, which afford them excellent nourishment, as all of this kind live in the water before they get their wings."—Mr. Biberg proceeds to enumerate many other birds that migrate to different regions; and he then adds: "By these migrations, birds become useful to many different countries, and are distributed almost over

all the globe; and I cannot here forbear expressing my admiration, that all of them exactly observe the times of coming and going, and that they never mistake their way."—*Biberg on the Economy of Nature*, in *Stillingfleet's Misc. Tracts*.

The principal food of the birds of passage, while in Great Britain, is the fruit of the whitethorn, or haws, which hang on our hedges in winter in prodigious plenty; but where they breed, and seem to be most at ease, as in Sweden, &c. there are no haws; nor indeed in many of the countries through which they journey on their way: so that it is evident they change their food in their passage.

The manner in which the birds of passage journey to their southern abodes is supposed to vary, according to the different structure of their bodies, and their power of supporting themselves in the air. The birds with short wings, such as the redstart, black-cap, &c. though they are incapable of such long flights as the swallow, or of flying with such celerity, yet may pass to less distant places, and by slower movements. Swallows and cuckoos may perform their passage in a very short time; but there is for them no necessity for speed, since every day's passage affords them an increase of warmth, and a continuance of food.

Swallows are often observed, in innumerable flocks, on churches, rocks, and trees, previous to their departure hence; and Mr. Collinson proves their return here, perhaps in equal numbers, by two curious relations of undoubted credit; the one communicated to him by Mr. Wright, the master of a ship, and the other by Admiral Sir Charles Wager.—“Returning home, (says Sir Charles,) in the spring of the year, as I came into soundings in our channel, a great flock of swallows came and settled on my rigging; every rope was covered; they hung on one another, like a swarm of bees; the decks and awning were filled with them. They seemed almost famished and spent, and were only feathers and bones; but, being recruited with a night's rest, they took their flight in the morning.” This apparent fatigue proves that they must have had a long journey, considering the amazing swiftness of these birds; so that, in all probability, they had crossed the Atlantic Ocean, and were returning from the shores of Senegal, or other parts of Africa.

Naturalists are much divided in their opinion concerning the periodical appearance and disappearance of swallows.—Some assert, that they remove from climate to climate, at those particular seasons when winged insects, their natural food, fail in one country and are plentiful in another, where they likewise find a temperature of air better suited to their constitution. In support of this opinion, we have the testimony of Sir Charles Wager, and of Mr. Adamson, who, in the ac-

count of his voyage, informs us, that, about fifty leagues from the coast of Senegal, four swallows settled upon the ship, on the 6th day of October; that these birds were taken; and that he knew them to be the true swallow of Europe, which he conjectures were then returning to the coast of Africa.

But Mr. Daines Barrington, in a curious essay on this subject, has adduced many arguments and facts, to prove that no birds, however strong and swift in their flight, can possibly fly over such large tracts of ocean as has been commonly supposed. He is of opinion, therefore, that the swallows mentioned by Mr. Adamson, instead of being on their passage from Europe, were only fluttering from the Cape de Verde islands to the continent of Africa; a much nearer flight, but to which they seemed to be unequal, as they were obliged, from fatigue, to alight upon the ship, and fall into the hands of the sailors. And Mr. Kalm, another advocate for the torpidity of swallows during the winter, having remarked, however, that he himself had met with them nine hundred and twenty miles from any land; Mr. Barrington endeavours to explain these, and similar facts, by supposing that birds discovered in such situations, instead of attempting to cross large branches of the ocean, have been forcibly driven from some coast by storms, and that they would naturally perch upon the first vessel they could see.

In a word, Mr. Barrington is further of opinion, with some other naturalists, that the swallows do not leave this island at the end of autumn, but that they lie in a torpid state, till the beginning of summer, in the banks of rivers, in the hollows of decayed trees, the recesses of old buildings, the holes of sand-banks, and in similar situations. Among other facts, Mr. Barrington communicated one to Mr. Pennant, that "numbers of swallows have been found in old dry walls, and in sand-hills, near the seat of the late Lord Belhaven, in East Lothian; not once only, but from year to year; and that, when they were exposed to the warmth of a fire, they revived."

These, and other facts of the same kind, are allowed to be incontrovertible; and Mr. Pennant, in particular, infers from them, that "we must divide our belief relative to these two so different opinions, and conclude, that one part of the swallow tribe migrate, and that others have their winter quarters near home."

But there are still more wonderful facts related. Mr. Kalm remarks, that "swallows appear in the Jerseys about the beginning of April; that, on their first arrival, they are wet, because they have just emerged from the sea or lakes, at the bottom of which they had remained, in a torpid state, during the whole winter." Other naturalists have asserted, that swallows pass the winter immersed under the ice, at the bottom of lakes, or

beneath the waters of the sea. Olaus Magnus, archbishop of Upsal, seems to have been the first who adopted this opinion. He informs us, that "swallows are found in great clusters at the bottoms of the northern lakes, with mouth to mouth, wing to wing, foot to foot, and that in autumn they creep down the reeds to their subaqueous retreats." In other instances, Mr. Pennant remarks, the good archbishop did not want credulity. But the submersion of the swallows under water does not rest upon his testimony alone. Klein asserts the same; and gives the following account of the manner of their retiring, which he had from some countrymen:

"They asserted, that the swallows sometimes assembled in numbers on a reed, till it broke, and sunk them to the bottom; that their immersion was preceded by a kind of dirge, which lasted more than a quarter of an hour; that others united, laid hold of a straw with their bills, and plunged down in society; that others, by clinging together with their feet, formed a large mass, and in this manner committed themselves to the deep." Bishop Pontoppidan asserts, that clusters of swallows, in their torpid winter state, have sometimes been found by fishermen, among reeds and bushes in lakes; and he charges Mr. Edwards with having, in his *Natural History of Birds*, groundlessly contradicted this incontestable truth. And Mr. Heerkens, a celebrated Dutch naturalist, in a poem on the birds of Friesland, speaks in positive terms of the torpid state, and submersion, of the swallows:

"Ere winter his somnif'rous power exerts,
Six dreary months the swallow-tribes are seen
In various haunts conceal'd; in rocks, and caves,
And structures rude, by cold benumb'd, asleep;
Bill within bill inserted, clust'ring thick:
Or solitary some, of mate bereft.
But, wonderful to tell! some lie immers'd,
Inanimate, beneath the frigid waves,
As if a species of the finny kinds."

Mr. Heerkens, after reciting many instances, and producing in his notes many authorities, of swallows having been found in a torpid state, proceeds, in his poem, to describe, very minutely, their ascent out of the water. The drowsy birds appear on the shore, as if unconscious still of life. Some inhale the soft breeze, like one of the finny tribe exiled from its stream. Some begin to adjust their dishevelled wings.—Others, almost revived, essay, with busy bill, to assist their aged companions. All, at length, restored to the unrestrained use of their wings, range, in numerous flights, the aerial way.

Two reasons have been adduced to prove this supposed submersion of swallows impossible. "In the first place, (says

Mr. Smellie,) no land animal can exist so long without some degree of respiration. The otter, the seal, and water fowls of all kinds, when confined under the ice, or entangled in nets, soon perish; yet it is well known, that animals of this kind can remain much longer under water than those who are destitute of that peculiar structure of the heart, which is necessary for any considerable residence beneath that penetrating element."

Mr. John Hunter, in a letter to Mr. Pennant, informs us, "that he had dissected many swallows, but found nothing in them different from other birds, as to the organs of respiration; that all those animals which he had dissected, of the class that sleep during the winter, such as lizards, frogs, &c. had a very different conformation as to those organs; that all those animals, he believes, do breathe in their torpid state, and, as far as his experience reaches, he knows they do; and that, therefore, he esteems it a very wild opinion, that terrestrial animals can remain any long time under water without drowning." Another argument against their submersion arises from the specific gravity of the animals themselves. Of all birds, the swallow tribes are perhaps the lightest. Their plumage, and the comparative smallness of their weight, indicates that Nature destined them to be almost perpetually on the wing, in quest of food. From this specific lightness, the submersion of swallows, and their continuing for months under water, amount to a physical impossibility. Even water fowls, when they wish to dive, are obliged to rise and plunge with considerable exertion, in order to overcome the resistance of the water. Klein's idea of swallows employing reeds and straws as means of submersion, is rather ludicrous; for these light substances, instead of being proper instruments for assisting them to reach the bottom, would infallibly contribute to support them on the surface, and prevent the very object of their intention. Besides, admitting the possibility of their reaching the bottom of lakes and seas, and supposing they could exist for several months without respiration, what would be the consequence? The whole would soon be devoured by otters, seals, and fishes, of various kinds. Nature is always anxious for the preservation of its species. But if the swallow tribes were destined to remain torpid during the winter months, at the bottom of lakes and seas, she would act in opposition to her own intentions; for, in a season or two, the whole genus would be annihilated.

This reasoning is very ingenious, but, on the other hand, the facts related above are very stubborn; and the celebrated Buffon does not hesitate to yield to the force of such strong and concurrent evidence. He had procured some chimney-swallows, and kept them some time in an icehouse, in order

to ascertain whether they were of the torpid kind, and he thus relates the result of his experiments. "None of them fell into the torpid state; the greater part died, and not one of them revived by being moved into the warmth of the sun. Those that had not long suffered the cold of the icehouse, had all their movements, and went out briskly. From these experiments I thought I might conclude, that this species of the swallow was not liable to that state of torpor and insensibility, which supposes, notwithstanding, and very necessarily, the fact of their remaining at the bottom of the water during the winter. Having had recourse, moreover, to the most creditable travellers, I found them agreed as to the passage of swallows over the Mediterranean. And Mr. Adamson has positively assured me, that during the long stay he made in Senegal, he observed the long-tailed swallow, the same with the chimney-swallow we are now speaking of, arrive constantly in Senegal about the time it leaves France, and as constantly leave Senegal in the spring. It cannot, therefore, be doubted, that this species of the swallow passes from Europe into Africa in the autumn, and from Africa to Europe in the spring; of consequence, it neither sleeps nor hides itself in holes, nor plunges into the water on the approach of winter. There is, besides, another well authenticated fact, which comes in proof here, and shews that this swallow is not reduced to a torpid state by cold, which it can bear to a certain degree, (and if that degree is exceeded, it dies,) for if we observe these birds towards the end of the warm season, we shall see them, a little before their departure, flying together in families, the father, the mother, and the young brood. Afterwards several families unite, and form themselves into flocks, more or less numerous in proportion as the time of their departure draws near. At last they go all together, three or four days before the end of September, or about the beginning of October. Still, however, some remain, and do not set off till a week, a fortnight, or three weeks after the rest: and some too there are which do not go at all, but stay and perish under the first rigours of the cold. These swallows that delay their flight, or never undertake it, are such as find their young too weak to follow them; such as have had the misfortune to have their nests destroyed after laying, and have been obliged to rebuild them a second or a third time. They stay for the love of their little ones, and choose rather to endure the rigour of the season, than to abandon their offspring. Thus they remain some time after the rest for the purpose of taking their young with them; and if they are unable to carry them off in the end, they perish with them.

These facts then plainly demonstrate (concludes Mr. Buf-

fon) that the chimney-swallows pass successively and alternately from our climate to another that is warmer; that they spend their summer here, and their winter there; and of consequence never fall into a state of insensibility. But, on the other hand, what have we to oppose to the precise testimony of those, who, on the approach of winter, have seen these swallows in troops throw themselves into the water; nay, not only this, but have seen them taken out in nests from beneath the ice? What answer shall we make to those who have beheld them in the torpid state, and seen them gradually recover motion and life, when they were brought into the warmth, and moved cautiously towards a fire? I know but of one means of reconciling these facts: we must suppose that the sleeping and travelling swallow are of different species, though the difference, for want of attention, has not been observed."

Thus this great philosopher concurs with Mr. Pennant, in his solution, already mentioned, of the difficulty, by supposing two species—the migrating, and the sleeping swallow. With respect to the principal objects of this wonderful instinct, that teaches such various kinds of the feathered race to migrate to different countries, it is obvious, from what has already been said, that they are governed by their food, temperature of air, and convenient situations for breeding.

We shall now give an account of the **CURIOUS METHOD OF BIRD-CATCHING IN THE FARO ISLES.**—The manner of bird-catching in the Faro Islands, is exceedingly strange and hazardous. Necessity compels man to wonderful attempts. The cliffs which contain the objects of their search, are often two hundred fathoms in height, and are attempted both from above and below. In the first case, the fowlers provide themselves with a rope eighty or a hundred fathoms in length. The fowler fastening one end about his waist, and between his legs, recommends himself to the protection of the Almighty, and is lowered down by six others, who place a piece of timber on the margin of the rock, to preserve the rope from wearing against the sharp edge. They have, besides, a small line fastened to the body of the adventurer, by which he gives signals, that they may lower or raise him, or shift him from place to place. The last operation is attended with great danger, by the loosening of the stones, which often fall on his head, and would infallibly destroy him, were he not protected by a strong thick cap; but even this is found unequal to save him against the weight of the larger fragments of rock. The dexterity of the fowlers is amazing; they will place their feet against the front of the precipice, and dart themselves some fathoms from it; with a cool eye survey the places where

the birds nestle, and again shoot into their haunts. In some places the birds lodge in deep recesses. The fowler will alight there, disengage himself from the rope, fix it to a stone, and at his leisure collect the booty, fasten it to his girdle, and resume his pendulous seat. At times he will again spring from the rock, and in that attitude, with a fowling-net placed on a staff, catch the old birds that are flying to and from their retreats. When he has finished his dreadful employ, he gives a signal to his friends above, who pull him up, and share his hard-earned profit. The feathers are preserved for exportation: the flesh is partly eaten fresh, but the greater part is dried for winter's provision.

The fowling from below has also its share of danger. The party goes on the expedition in a boat; and when it has attained the base of the precipice, one of the most daring, having fastened a rope about his waist, and furnished himself with a long pole, with an iron hook at one end, either climbs or is thrust up by his companions, who place a pole under his breech, to the next footing spot he can reach. He, by means of the rope, brings up one of the boat's crew; the rest are drawn up in the same manner, and each is furnished with his rope and fowling-staff. They then continue their progress upwards in the same manner, till they arrive at the regions of the birds, and wander about the face of the cliff in search of them. They then act in pairs; one fastens himself to the end of his associate's rope, and, in places where the birds have nestled beneath his footing, he permits himself to be lowered down, depending for his security on the strength of his companion, who has to haul him up again; but it sometimes happens that the person above is overpowered by the weight, and both inevitably perish. They fling the fowl into the boat, which attends their motions, and receives the booty. They often pass seven or eight days in this tremendous employ, and lodge in the crannies which they find in the face of the precipice.

We shall close this division of our work with **A CURIOUS ACCOUNT OF THE SONG OF BIRDS.**—We introduce the subject by the following poetical quotations; which, we have no doubt, will interest every admirer of nature, and nature's God.

Every copse
Deep-tangled, tree irregular, and bush
Bending with dewy moisture, o'er the heads
Of the coy choristers that lodge within,
Are prodigal of harmony.

Thomson

Each bird,
Or high in air, or secret in the shade,
Rejoicing, warbles wild his grateful hymn.

Mallet

From branch to branch the smaller birds with song
Solace the woods, and spread their painted wings
Till even; nor then the solemn nightingale
Ceases to warble: in shadiest covert hid,
She all the night tunes her soft lays.

Milton.

Again:—

—————The sweet poet of the vernal groves
Melts all the night in strains of am'rous woe.

Armstrong.

Again:—

—————When the spring renews the flow'ry field,
And warns the pregnant nightingale to build,
She seeks the safest shelter of the wood,
Where she may trust her little tuneful brood.
Fond of the chosen place, she views it o'er,
Sits there, and wanders through the grove no more:
Warbling, she charms it each returning night;—
And gives the pensive mind a calm delight.

Rowe.

The lark, that shuns on lofty boughs to build
Her humble nest, sits silent in the field;
But if the promise of a cloudless day,
(Aurora smiling,) bids her rise and play,
Then straight she shews 'twas not for want of voice,
Or pow'r to climb, she made so low a choice;
Singing she mounts, her airy wings are stretch'd
Tow'rds heaven, as if from heav'n her note she fetch'd. Waller.

—————Birds of sweetest song
Attune from native boughs their various lay,
And cheer the forest; those of brighter plume
With busy pinion skim the glitt'ring wave,
Or tempt the sun, ambitious to display
Their several merit.

Shenstone.

The Song of Birds is defined, by the Hon. Daines Barrington, to be a succession of three or more different notes, which are continued without interruption, during the same interval, with a musical bar of four crotchets, in an adagio movement, or whilst a pendulum swings four seconds. It is affirmed, that the notes of birds are no more innate than language in man, and that they depend upon imitation, as far as their organs will enable them to imitate the sounds which they have frequent opportunities of hearing: and their adhering so steadily, even in a wild state, to the same song, is owing to the nestling attending only to the instruction of the parent bird, whilst they disregard the notes of all others that may be singing around them. Birds in a wild state do not usually sing above ten weeks in the year; whereas birds that have plenty of food in a cage, sing the greatest part of the year: the female of no species of birds ever sings. This is a wise provision, because her song would discover her nest. In the same manner, we may account for her inferiority of plumage. The faculty of singing is confined to the cock birds; and accordingly Mr. Hunter, in dissecting birds of several species, found the mus-

cles of the larynx to be stronger in the nightingale than in any other bird of the same size ; and in all those instances where he dissected both cock and hen, the same muscles were stronger in the cock.

It is an observation as ancient as the time of Pliny, that a capon does not crow. Some ascribe the singing of the cock in the spring solely to the motive of pleasing his mate during incubation ; others, who allow that it is partly for this end, believe it is partly owing to another cause, viz. the great abundance of plants and insects in spring, which are the proper food of singing birds at that time of the year, as well as seeds. Mr. Barrington remarks, that there is no instance of any singing bird which exceeds our blackbird in size ; and this, he supposes, may arise from the difficulty of concealing itself, should it call the attention of its enemies, not only by its bulk, but by the proportionate loudness of its notes. He further observes, that some passages of the song in a few kinds of birds correspond with the intervals of our musical scale, of which the cuckoo is a striking and known instance ; but the greater part of their song cannot be reduced to a musical scale : partly because the rapidity is often so great, and it is also so uncertain when they may stop, that we cannot reduce the passages to form a musical bar in any time whatsoever ; partly also, because the pitch of most birds is considerably higher than the most shrill notes of those instruments which have the greatest compass ; and principally, because the intervals used by birds are commonly so minute, that we cannot judge of them from the more gross intervals into which we divide our musical octave. This writer apprehends, that all birds sing in the same key ; and he found by a nightingale, as well as a robin which was educated under him, that the notes reducible to our intervals of the octave were always precisely the same. Most people, who have not attended to the notes of birds, suppose, that every species sing exactly the same notes and passages : but this is not true ; though there is a general resemblance. Thus the London bird-catchers prefer the song of the Kentish goldfinches, and Essex chaffinches ; and some of the nightingale fanciers prefer a Surrey bird to those of Middlesex.

Of all singing birds, the song of the nightingale has been most universally admired ; and its superiority consists in the following particulars : its tone is much more mellow than that of any other bird, though, at the same time, by a proper exertion of its musical powers, it can be very brilliant. Another superiority is, its continuance of song without a pause, which is sometimes twenty seconds ; and when respiration becomes necessary, it takes it with as much judgment as an opera singer. The skylark, in this particular, as well as in

compass and variety, is only second to the nightingale. The nightingale also sings with judgment and taste. Mr. Barington says, that his nightingale began softly, like the ancient orators, reserving its breath to swell certain notes, which thus had a most astonishing effect. He adds, that the notes of birds which are annually imported from Asia, Africa, and America, both singly and in concert, are not to be compared to those of European birds. He has also formed a table, to exhibit the comparative merits of the British singing birds; wherein twenty being the point of perfection, he states the nightingale at nineteen; the woodlark and skylark at eighteen; the blackcap at fourteen; the titlark, linnet, goldfinch, and robin, at twelve; with some variations respecting mellowness, sprightliness, execution, &c. for which, with the proportional differences of other birds, we refer to his work.

We cannot resist the temptation to insert the following well-known

INVITATION TO THE FEATHERED RACE.

Written at Claverton, near Bath

AGAIN the balmy zephyr blows,
Fresh verdure decks the grove;
Each bird with vernal rapture glows,
And tunes his notes to love.

Ye gentle warblers, hither fly,
And shun the noontide heat;
My shrubs a cooling shade supply,
My groves a safe retreat.

Here freely hop from spray to spray,
Or weave the mossy nest,
Here rove and sing the live-long day,
At night here sweetly rest.

Amidst this cool translucent rill,
That trickles down the glade,
Here bathe your plumes, here drink your fill
And revel in the shade.

No schoolboy rude, to mischief prone
E'er shows his ruddy face,
Or twangs his bow, or hurls a stone,
In this sequester'd place.

Hither the vocal thrush repairs,
Secure the linnet sings:
The goldfinch dreads no slimy snares,
To clog her painted wings.

Sad Philomel! ah, quit thy haunt,
Yon distant woods among,
And round my friendly grotto chaunt
Thy sweetly plaintive song.

Let not the harmless redbreast fear,
 Domestic bird, to come
 And seek a sure asylum here,
 With one that loves his home.

My trees for you, ye artless tribe,
 Shall store of fruit preserve:
 O let me thus your friendship bribe!
 Come, feed without reserve.

For you these cherries I protect,
 To you these plums belong;
 Sweet is the fruit that you have pick'd,
 But sweeter far your song.

Let then this league betwixt us made,
 Our mutual interest guard;
 Mine be the gift of fruit and shade
 Your songs be my reward.

Grass

CHAP. XXII.

CURIOSITIES RESPECTING INSECTS.

THE HONEY BEE.

To their delicious task the fervent bees,
 In swarming millions, tend; around, athwart,
 Through the soft air the busy nations fly,
 Cling to the bud, and with inserted tube
 Suck its pure essence, its ethereal soul;
 And oft, with bolder wing, they, soaring, dare
 The purple heath, or where the wild thyme grow,
 And yellow load them with the luscious spoil.

Thomson.

What various wonders may observers see
 In a small insect—the sagacious bee!
 Mark how the little untaught builders squar
 Their rooms, and in the dark their lodgings rear;
 Nature's mechanics, they unwearied strive
 And fill, with curious labyrinths, the hive.
 See what bold strokes of architecture shine
 Through the whole frame, what beauty, what design!

Blackmore.

THIS important insect has been long and justly celebrated for its wonderful polity, the neatness and precision with which it constructs its cells, and the diligence with which it provides during the warmth of summer, a supply of food for the support of the hive during the rigours of the succeeding winter. The general history of this interesting insect has been amply detailed by various authors, as Swammerdam, Reaumur, &c. &c. Among the most elaborate accounts of later times, may be mentioned that of Mr. John Hunter, which made its appearance in the Philosophical Transactions for the year 1792;

and that of M. Huber, contained in his *Nouvelles Observations sur les Abeilles*, addressed to M. Bonnet, the celebrated author of the "*Contemplations de la Nature*." The following account is drawn principally from Hunter and Huber.

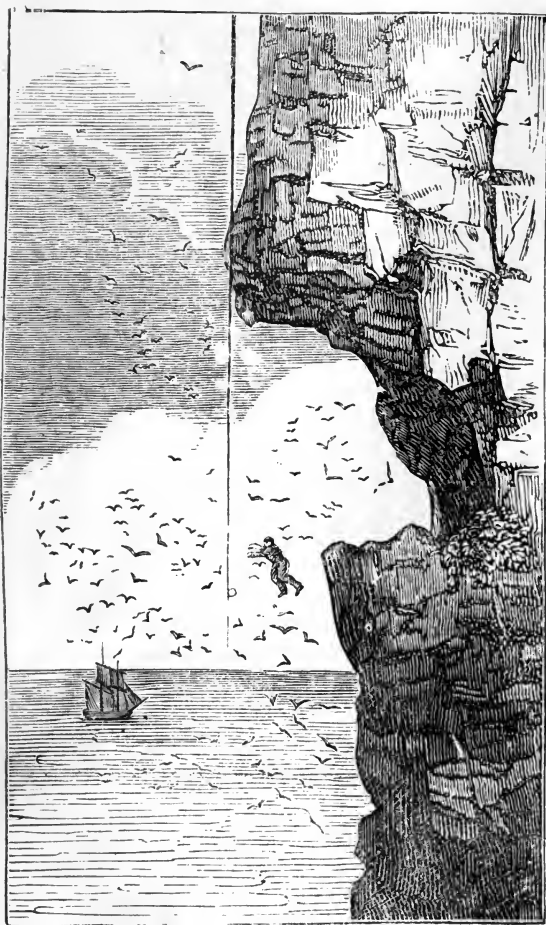
There are three periods, observes Hunter, at which the history of the bee may commence: first, in the spring, when the queen begins to lay her eggs; in the summer, at the commencement of a new colony; or in the autumn, when they go into winter-quarters. We shall begin the particular history of the bee with the new colony, when nothing is formed. When a hive sends off a colony, it is commonly in the month of June; but that will vary according to the season, for, in a mild spring, bees sometimes swarm in the middle of May, and very often at the latter end of it. Before they come off, they commonly hang about the mouth of the hole or door of the hive for some days, as if they had not sufficient room within for such hot weather, which we believe is very much the case; for if cold or wet weather come on, they stow themselves very well, and wait for fine weather. But swarming appears to be rather an operation arising from necessity; for they do not seem to remove voluntarily, because if they have an empty space to fill, they do not swarm; therefore, by increasing the size of the hive, the swarming is prevented. This period is much longer in some than in others. For some evenings before they come off, is often heard a singular noise, a kind of ring, or sound of a small trumpet; by comparing it with the notes of a piano-forte, it seemed to be the same sound with the lower A of the treble. The swarm commonly consists of three classes; a female or females, males, and those commonly called mules, which are supposed to be of no sex, and are the labourers; the whole, about two quarts in bulk, making about six or seven thousand. It is a question that cannot easily be determined, whether this old stock sends off only young of the same season, and whether the whole of their young ones, or only a part.

As the males are entirely bred in the same season, part go off; but part must stay, and most probably it is so with the others. They commonly come off in the heat of the day, often immediately after a shower. When one goes off, they all immediately follow, and fly about, seemingly in great confusion, although there is one principle actuating the whole. They soon appear to be directed to some fixed place; such as the branch of a tree or bush, the cavities of old trees, or holes of houses leading into some hollow place; and whenever the stand is made, they immediately repair to it till they are all collected. But it would seem, in some cases, that they had not fixed upon any resting-place before they come off, or, if they had, that they were either disturbed, if it was near, or



THE HONEY BEE.

PERILOUS ADVENTURE OF A BIRD-CATCHER.



The engraving represents the situation of a bird-catcher at St. Kilda. A tale is told of one of these men who had entered such a cavern, and in the excitement produced by finding its floor all strewn over with eggs, forgot the rope and loosened his hold: in a moment it was gone, and as he turned he saw it swinging at the mouth of the cavern. In vain he tried to reach it, it was beyond his grasp; he tried again and again, but all to no purpose, while, as if in mockery of his dismay, it swung idly in the air, just passing beyond his reach. What was he to do? A projection of rock concealed him from the observation of those above, while the roar of the sea prevented their hearing his cries. If they drew up the rope and found him not there, he knew they would

conclude he had lost his hold and dropped into the sea, and he would then be left to starve in the cave. The rope still kept passing backwards and forwards, as if tantalizing him with the hope of escape. Every minute now seemed an age; at length, almost wild with despair, he formed the desperate resolution to spring at the rope as it passed by him. He watched for a favorable opportunity and leaped from the cave: fortunately he was successful in catching it with a firm grasp, and was safely drawn again to the top.

that it was at a great distance ; for, after hovering some time, as if undetermined, they fly away, mount up into the air, and go off with great velocity. When they have fixed upon their future habitation, they immediately begin to make their combs for they have the materials within themselves. " I have reason," says Mr. Hunter, " to believe that they fill their crops with honey when they come away, probably from the stock in the hive. I killed several of those that came away, and found their crops full, while those that remained in the hive had their crops not near so full : some of them came away with farina on their legs, which I conceive to be rather accidental. I may just observe here, that a hive commonly sends off two, sometimes three swarms in a summer, but that the second is commonly less than the first, and the third less than the second ; and this last has seldom time to provide for the winter.

" The materials of their dwelling or comb, which is the wax, is the next consideration, with the mode of forming, preparing, or disposing of it. In giving a totally new account of the wax, I shall first shew it can hardly be what it has been supposed to be. First, I shall observe that the materials, as they are found composing the comb, are not to be found in the same state (as a composition) in any vegetable, where they have been supposed to be got. The substance brought in on the legs, which is the farina of the flowers of plants, is, in common, I believe, imagined to be the materials of which the wax is made, for it is called by most, the wax : but it is the farina, for it is always of the same colour as the farina of the flower where they are gathering ; and, indeed, we see them gathering it, and we also see them covered almost all over with it like a dust : nevertheless, it has been supposed to be the wax, or that the wax was extracted from it. Reaumur is of this opinion.

" I made several experiments, to see if there was such a quantity of oil in it, as would account for the quantity of wax to be formed, and to learn if it was composed of oil. I held it near the candle ; it burnt, but did not smell like wax, and had the same smell when burning, as farina when it was burnt. I observed, that this substance was of different colours on different bees, but always of the same colour on both legs of the same bee ; whereas a new-made comb was all of one colour. I observed, that it was gathered with more avidity for old hives, where the comb is complete, than for those hives where it was only begun, which we could hardly conceive, admitting it to be the materials of wax. Also we may observe, that at the very beginning of a hive, the bees seldom bring in any substance on their legs for two or three days, and after that, the farina gatherers begin to increase ; for now some

cells are formed to hold it as a store, and some eggs are laid, which, when hatched, will require this substance as food, and which will be ready when the weather is wet.

"The wax is formed by the bees themselves; it may be called an external secretion of oil, and I have found that it is formed between each scale of the under side of the belly. When I first observed this substance, in my examination of the working bee, I was at a loss to say what it was: I asked myself if it were scales forming, and whether they cast the old, as the lobster, &c. does? but it was to be found only between the scales on the lower side of the belly. On examining the bees through glass hives, while they were climbing up the glass, I could see that most of them had this substance, for it looked as if the lower or posterior edge of the scale was double, or that there were double scales; but I perceived it was loose, not attached. Finding that the substance brought in on their legs was farina, intended, as appeared from every circumstance, to be the food of the bee, and not to make wax; and not having yet perceived any thing that could give me the least idea of wax; I conceived these scales might be it, at least I thought it necessary to investigate them. I therefore took several on the point of a needle, and held them to a candle, where they melted, and immediately formed themselves into round globules; upon which I no longer doubted that this was the wax, which opinion was confirmed to me by not finding those scales but in the building season.

"The cells, or rather the congeries of cells, which compose the comb, may be said to form perpendicular plates, or partitions, which extend from top to bottom of the cavity in which they build, and work downwards; but if the upper part of this vault to which their combs are fixed, is removed, and a dome is put over, they begin at the upper edge of the old comb, and work up into the new cavity at the top. They generally may be guided, as to the directions of their new plates, by forming ridges at top, to which they begin to attach their combs. In a long hive, if these ridges are longitudinal, their plates of comb will be longitudinal; if placed transversely, so will be the plates; and if obliquely, the plates of comb will be oblique also. Each plate consists of a double set of cells, whose bottoms form the partition between each set. The plates themselves are not very regularly arranged, not forming a regular plane where they might have done so, but are often adapted to the situation or shape of the cavity in which they are built.

"The bees do not endeavour to shape their cavity to their work, as the wasps do, nor are the cells of equal depths, also fitting them to their situation; but as the breeding cells must all be of a given depth, they reserve a sufficient number for breeding in, and they put the honey into the others, as also

into the shallow ones. The attachment of the comb round the cavity is not continued, but interrupted, so as to form passages in the middle of the plates, especially if there be a cross-stick to support the comb; these allow of bees to go across from plate to plate. The substance which they use for attaching their combs to surrounding parts, is not the same as the common wax; it is softer and tougher, a good deal like the substance with which they cover in their chrysalis, or the humblebee surrounds her eggs. It is probably a mixture of wax with farina. The cells are placed nearly horizontal, but not exactly so; the mouth raised a little, which probably may be to retain the honey the better: however, this rule is not strictly observed, for often they are horizontal, and towards the lower edge of a plane of comb they are often declining. The first combs that a hive forms are the smallest, and much neater than the last or lowermost. Their sides or partitions, between cell and cell, are much thinner, and the hexagon is much more perfect. The wax is purer, being probably little else but wax, and it is more brittle. The lower combs are considerably larger, and contain much more wax, or perhaps, more properly, more materials; and the cells are at such distances as to allow them to be of a round figure; the wax is softer, and there is something mixed with it. I have observed that the cells are not all of equal size, some being a degree larger than others; and that the small are the first formed, and of course at the upper part, where the bees begin; and the larger are nearer the lower part of the comb, or last made: however, in hives of a particular construction, where the bees may begin to work at one end, and can work both down and towards the other end, we often find the larger cells both on the lower part of the combs, and also at the opposite end; these are formed for the males to be bred in: in the hornet and wasp combs there are larger cells for the queens to be bred in; these are also formed in the lower tier, and are the last formed.

“The first comb made in a hive is all of one colour, viz. almost white; but is not so white towards the end of the season, having then more of a yellow cast.”

What follows is principally abridged from Huber, who in many instances is more correct than Hunter.—A hive contains three kind of bees. 1. A single queen bee, distinguishable by the great length of her body, and the proportional shortness of her wings. 2. Working-bees, female non-breeders, or, as they were formerly called, neuters, to the amount of many thousands; these are the smallest bees in the hive, and are armed with a sting. 3. Drones, or males, to the number perhaps of fifteen hundred or two thousand; these are larger

than the workers, and of a dark colour; they make a great noise in flying, and have no sting. The whole labour of the community is performed by the workers: they elaborate the wax, and construct the cells; they collect the honey, and feed the brood. The drones, numerous as they are, serve no other purpose than to ensure the increase of the hive, and are regularly massacred by the workers at the beginning of autumn.

It is the office of the queen-bee to lay the eggs. These remain about three days in the cells before they are hatched. A small white worm then makes its appearance, (called indifferently, worm, larva, maggot, or grub;) this larva is fed with honey for some days, and then changes into a nymph or pupa. After passing a certain period in this state, it comes forth a perfect winged insect.

M. Huber, after noticing the propagation of this industrious race, next states the accidental discovery of the very singular and unexpected consequences which follow from retarding the impregnation of the queen-bee beyond the twentieth or twenty-first day of her life. In the natural order of things, or when impregnation is not retarded, the queen begins to lay the eggs of workers forty-six hours after, and she continues for the subsequent eleven months to lay none but these; "and it is only after this period, that a considerable and uninterrupted laying of the eggs of drones commences. When, on the contrary, impregnation is retarded after the twenty-eighth day, the queen begins, from the forty-sixth hour, to lay the eggs of drones; and she lays no other kind during her whole life." It would be tedious to detail the experiments; they were numerous, and the results uniform. "I occupied myself (says M. Huber) the remainder of 1787, and the two subsequent years, with experiments on retarded fecundation, and had constantly the same results." It is undoubted, therefore, that when the course of natural instinct is retarded beyond the twentieth day, only an imperfect generation is produced; as the queen, instead of laying the eggs of workers and of males equally, will lay those of males only.

This discovery is entirely M. Huber's own: and so difficult is it to offer any plausible explanation of the fact, that he himself has scarcely attempted it.

The working-bees had been for ages considered as entirely destitute of sex; and hence, in the writings of many authors, they are denominated neuters, but from the experiments of Schirach and Huber, it seems now to be clearly ascertained, that the workers are really of the female sex.

M. Huber confirms the curious discovery of M. Schirach, that when bees are by any accident deprived of their queen, they have the power of selecting one or two grubs of workers, and of converting them into queens; and that they accom-

plish this by greatly enlarging the cells of those selected *arvæ*, by supplying them more copiously with food, and with that of a more pungent sort than is given to the common *larvæ*.

M. Huber gives the following curious account of the manner in which bees proceed in forming capacious cells for the workers' grubs destined to royalty.—“Bees soon become sensible of having lost their queen, and in a few hours commence the labour necessary to repair their loss. First they select the young common worms, which the requisite treatment is to convert into queens, and immediately begin with enlarging the cells where they are deposited. Their mode of proceeding is curious; and the better to illustrate it, I shall describe the labour bestowed on a single cell, which will apply to all the rest containing worms destined for queens. Having chosen a worm, they sacrifice three of the contiguous cells; next they supply it with food, and raise a cylindrical enclosure around, by which the cell becomes a perfect tube, with a rhomboidal bottom; for the parts forming the bottom are left untouched. If the bees damaged it, they would lay open three corresponding cells on the opposite surface of the comb, and consequently destroy their worms, which would be an unnecessary sacrifice, and nature has opposed it. Therefore, leaving the bottom rhomboidal, they are satisfied with raising a cylindrical tube around the worm, which, like the other cells in the comb, are horizontal. But this habitation remains suitable to the worm called to the royal state, only during the first three days of its existence: another situation is requisite for the other two days it is a worm. During that time, though so small a portion of its life, it must inhabit a cell nearly of a pyramidal figure, and hanging perpendicularly. The workers, therefore gnaw away the cells surrounding the cylindrical tube, mercilessly sacrifice their worms, and use the wax in constructing a new pyramidal tube, which they solder at right angles to the first, and work it downwards. The diameter of this pyramid decreases insensibly from the base, which is very wide, to the point. In proportion as the worm grows, the bees labour in extending the cell, and bring food, which they place before its mouth, and near its body, forming a kind of cord around it. The worm, which can move only in a spiral direction, turns incessantly to take the food before its head: it insensibly descends, and at length arrives at the orifice of the cell. Now is the time of transformation to a nymph. As any further care is unnecessary, the bees close the cell with a peculiar substance appropriated for it, and there the worm undergoes both its metamorphoses.”

M. Huber relates some experiments which confirm the singular discovery of M. Riems, concerning common working

bees that are capable of laying eggs,—which, we may remark, is certainly a most convincing proof of their being of the female sex. Eggs were observed to increase in number daily, in a hive in which there were no queens of the usual appearance; but small queens considerably resemble workers, and to discriminate them, required minute inspection. “My assistant,” (says M. Huber,) then offered to perform an operation that required both courage and patience, and which I could not resolve to suggest, though the same expedient had occurred to myself. He proposed to examine each bee in the hive separately, to discover whether some small queen had not insinuated herself among them, and escaped our first researches. It was necessary, therefore, to seize every one of the bees, notwithstanding their irritation, and to examine their specific character with the utmost care. This my assistant undertook, and executed with great address. Eleven days were employed in it; and, during all that time, he scarcely allowed himself any relaxation but what the relief of his eyes required. He took every bee in his hand; he attentively examined the trunk, the hind limbs, and the sting; and he found that there was not one without the characteristics of the common bee, that is, the little basket on the hind legs, the long trunk, and the straight sting.”

When a supernumerary queen is produced in a hive, or is introduced into it in the course of experiment, either she or the rightful owner soon perishes. The German naturalists, Schirach and Riems, imagined that the working bees assailed the stranger, and stung her to death. Reaumur considered it as more probable, that the sceptre was made to depend on the issue of a single combat between the claimants; and this conjecture is verified by the observations of Huber. The same hostility towards rivals, and destructive vengeance against royal cells, animates all queens, whether they be virgins, or in a state of impregnation, or mothers of numerous broods. The working bees, it may here be remarked, remain quiet spectators of the destruction, by the first-hatched queen, of the remaining royal cells; they approach only to share in the plunder presented by their havock-making mistress, greedily devouring any food found at the bottom of the cells, and even sucking the fluid from the abdomen of the nymphs before they toss out the carcase.

The following fact, connected with this subject, is one of the most curious perhaps in the whole history of this wonderful insect. Whenever the workers perceive that there are two rival queens in the hive, numbers of them crowd around each; they seem to be perfectly aware of the approaching deadly conflict, and willing to prompt their Amazonian chieftains to the battle; for as often as the queens shew a disinclination

to fight, or seem inclined to recede from each other, or to fly off, the bees immediately surround and detain them; but when either combatant shews a disposition to approach her antagonist, all the bees forming the clusters instantly give way, to allow her full liberty for the attack. It seems strange that those bees, who in general shew so much anxiety about the safety of their queen, should, in particular circumstances, oppose her preparations to avoid impending danger,—should seem to promote the battle, and to excite the fury of the combatants.

When a queen is removed from a hive, the bees do not immediately perceive it; they continue their labours, “watch over their young, and perform all their ordinary occupations. But, in a few hours, agitation ensues; all appears a scene of tumult in the hive. A singular humming is heard; the bees desert their young, and rush over the surface of the combs with a delirious impetuosity.” They have now evidently discovered that their sovereign is gone; and the rapidity with which the bad news spreads through the hive, to the opposite side of the combs, is very remarkable. On replacing the queen in the hive, tranquillity is almost instantly restored. The bees, it is worthy of notice, recognize the individual person of their own queen. If another be palmed upon them, they seize and surround her, so that she is either suffocated, or perishes by hunger; for it is very remarkable, that the workers are never known to attack a queen bee with their stings. If, however, more than eighteen hours have elapsed before the stranger queen be introduced, she has some chance to escape: the bees at first seize and confine her, but less rigidly; and they soon begin to disperse, and at length leave her to reign over a hive, in which she was at first treated as a prisoner. If twenty-four hours have elapsed, the stranger will be well received from the first, and at once admitted to the sovereignty of the hive. In short, it appears that the bees, when deprived of their queen, are thrown into great agitation; that they wait about twenty hours, apparently in hopes of her return; but that, after this interregnum, the agitation ceases, and they set about supplying their loss by beginning to construct royal cells. It is when they are in this temper, and not sooner, that a stranger queen will be graciously received; and upon her being presented to them, the royal cells, in whatever state of forwardness they may happen to be, are instantly abandoned, and the larvæ destroyed. Reaumur must therefore have mistaken the result of his own experiments, when he asserts, that a stranger queen is instantly well received, though presented at the moment when the other is withdrawn. He had seen the bees crowding around her at the entrance of the hive, and laying their antennæ over her

and this he seems to have taken for caressing. The structure of the hive he employed prevented him from seeing further; had he used the leaf-hive, or one of similar construction, he would have perceived that the apparent caresses of the guards were only the prelude to actual imprisonment.

It is well known, that after the season of swarming, a general massacre of the drones is commenced. Several authors assert, in their writings, that the workers do not sting the drones to death, but merely harass them till they are banished from the hive and perish. M. Huber contrived a glass table, on which he placed several hives, and he was thus able to see distinctly what passed at the bottom of the hive, which is generally dark and concealed: he witnessed a real and furious massacre of the males, the workers thrusting their stings so deep into the bodies of the defenceless drones, that they were obliged to turn on themselves as on a pivot, before they could extricate them. The work of death commenced in all the hives much about the same time. It is not, however, by a blind or indiscriminating instinct, that the workers are impelled thus to sacrifice the males; for if a hive be deprived of its queen, no massacre of the males takes place in it, while the hottest persecution rages in all the surrounding hives. In this case, the males are allowed to survive the winter. Mr. Bonner had observed this fact; he supposed, however, that the workers thus tolerated the drones for the sake of the additional heat they generated in the hive; but we now see the true reason to be, that without them the new queen would not be fruitful. The drones are also suffered to exist in hives that possess fertile workers, but no proper queen; and, what is remarkable, they are likewise spared in hives governed by a queen whose fecundity has been retarded. Here, then, we perceive a counter-instinct opposed to that which would have impelled them to the usual massacre.

Upon the subject of swarming, M. Huber commences with an interesting account of the hatching of the queen bee. When the pupa is about to change into the perfect insect, the bees render the cover of the cell thinner, by gnawing away part of the wax; and with so much nicety do they perform this operation, that the cover at last becomes pellucid, owing to its extreme thinness. This must not only facilitate the exit of the fly, but, M. Huber remarks, it may possibly be useful in permitting the evaporation of the superabundant fluids of the nymph. After the transformation is complete, the young queens would, in common course, immediately emerge from their cells, as workers and drones do; but the bees always keep them prisoners for some days in their cells, supplying them in the mean time with honey for food; a small hole being made in the door of each cell, through which the

confined bee extends its proboscis to receive it. The royal prisoners continually utter a kind of song, the modulations of which are said to vary. The final cause of this temporary imprisonment, it is suggested, may possibly be, that they may be able to take flight at the instant they are liberated. When a young queen at last gets out, she meets with rather an awkward reception; she is pulled, bitten, and chased, as often as she happens to approach the other royal cells in the hive. The purpose of nature here seems to be, that she should be impelled to go off with a swarm as soon as possible. A curious fact was observed on these occasions: when the queen found herself much harassed, she had only to utter a peculiar noise, (the commanding voice, we may presume, of sovereignty,) and all the bees were instantaneously constrained to submission and obedience. This is, indeed, one of the most marked instances in which the queen exerts her sovereign power.

The conclusions at which M. Huber arrives on the subject of swarms are the following:—

First, “A swarm is always led off by a single queen, either the sovereign of the parent hive, or one recently brought into existence. If, at the return of spring, we examine a hive well peopled, and governed by a fertile queen, we shall see her lay a prodigious number of male eggs in the course of May, and the workers will choose that moment for constructing several royal cells.” This laying of male eggs in May, M. Huber calls the great laying; and he remarks, that no queen ever has a great laying till she be eleven months old. It is only after finishing this laying, that she is able to undertake the journey implied in leading a swarm; for, previously to this, “*latum trahit alvum*,” which unfits her for flying. There appears to be a secret relation between the production of the male eggs, and the construction of royal cells. The great laying commonly lasts thirty days; and regularly, on the twentieth or twenty-first, several royal cells are founded.

Secondly, “When the larvæ hatched from the eggs laid by the queen in the royal cells are ready to transform to nymphs, this queen leaves the hive, conducting a swarm along with her; and the first swarm that proceeds from the hive is uniformly conducted by the old queen.” M. Huber remarks, that it was necessary that instinct should impel the old queen to lead forth the first swarm; for, that she being the strongest, would never have failed to have overthrown the younger competitors for the throne. An old queen, as has already been said, never quits a hive at the head of a swarm, till she has finished her laying of male eggs; but this is of importance, not merely that she may be lighter and fitter for flight, but that she may be ready to begin with the laying of workers’ eggs in her new habitation, workers being the bees first needed,

in order to secure the continuance and prosperity of the newly founded commonwealth.

Thirdly, "After the old queen has conducted the first swarm from the hive, the remaining bees take particular care of the royal cells, and prevent the young queens, successively hatched, from leaving them, unless at an interval of several days between each." Under this head he introduces a number of general remarks, some of which may prove useful. "A swarm (he observes) is never seen unless in a fine day, or, to speak more correctly, at a time of the day when the sun shines, and the air is calm. Sometimes we have observed all the precursors of swarming, disorder and agitation: but a cloud passed before the sun, and tranquillity was restored; the bees thought no more of swarming. An hour afterwards, the sun having again appeared, the tumult was renewed; it rapidly augmented, and the swarm departed." A certain degree of tumult commences as soon as the young queens are hatched, and begin to traverse the hive: the agitation soon pervades the whole bees; and such a ferment soon rages, that M. Huber has often observed the thermometer in the hive to rise suddenly from about 92° to above 104° : this suffocating heat he considers as one of the means employed by nature for urging the bees to go off in swarms. In warm weather, one strong hive has been known to send off four swarms in eighteen days.

The cause of the bees, which has been so eloquently and pathetically pleaded by the Poet of the Seasons, is supported by M. Huber, on a principle more intelligible, perhaps, and more persuasive, to most country bee-masters, viz. interest. He deprecates the destruction of bees, and recommends to the cultivator to be content with a reasonable share of the wealth of the hive; arguing very justly, we believe, that a little taken from each of a number of hives, is ultimately much more profitable than a greater quantity obtained by a total destruction of a few.

We conclude our observations on this curious insect by two poetical quotations.

"Of all the race of animals, alone
The bees have common cities of their own.
Mindful of coming cold, they share the pain,
And hoard for winter's use the summer's gain.
Some o'er the public magazines preside,
And some are sent new forage to provide;
These drudge in fields abroad, and those at home
Lay deep foundations for the labour'd comb;
To pitch the waxen flooring some contrive;
Some nurse the future nation of the hive.
Their toil is common, common is their sleep;
They shake their wings when morn begins to peep:
Rush through the city gates without delay,
Nor ends their work but with declining day."

Churchill, after the following beautiful and picturesque description, introduces a sovereign, drawing from it, in a soliloquy, the most natural reflections on the momentous duties of his station.

* * * * *

Strength in her limbs, and on her wings dispatch,
 The bee goes forth; from herb to herb she flies,
 From flow'r to flow'r, and loads her lab'ring thighs
 With treasur'd sweets, robbing those flow'rs, which left,
 Find not themselves made poorer by the theft,
 Their scents as lively, and their looks as fair.
 As if the pillager had not been there.
 Ne'er doth she flit on pleasure's silken wing,
 Ne'er doth she loit'ring let the bloom of spring
 Unruffled pass, and on the downy breast
 Of some fair flow'r indulge untimely rest.
 Ne'er doth she, drinking deep of those rich dews
 Which chemist Night prepar'd, that faith abuse
 Due to the hive, and, selfish in her toils,
 To her own private use convert the spoils.
 Love of the stock first call'd her forth to roam,
 And to the stock she brings her honey home."



CHAP. XXIII

CURIOSITIES RESPECTING INSECTS.—(*Continued.*)

WILD BEES.

The Clothier Bee.—The Carpenter Bee.—The Mason Bee.—The Upholsterer Bee.—The Leaf-cutter Bee.—Curious Account of an Idiot Boy and Bees.—Mr. Wildman's Curious Exhibitions of Bees explained.

THE CLOTHIER BEE.

Learn each small people's genius, policies,
 The ants' republic, and the realm of bees;
 How those in common all their wealth bestow
 And anarchy without confusion know;
 And these for ever, though a monarch reign,
 Their separate cells and properties maintain.
 Mark what unvary'd laws preserve each state,
 Laws, wise as Nature, and as fixt as Fate.

Pope.

THE following curious account of wild bees is principally abridged from Kirby and Spence's very interesting work on entomology.

The clothier bee is a lively and gay insect. It does not excavate holes for their reception, but places them in the cavities of old trees, or of any other object that suits its purpose. Sir Thomas Cullum discovered the nest of one in the inside of the lock of a garden gate, in which Mr. Kirby also

since twice found them. It should seem, however, that such situations would be too cold for the grubs without a coating of some non-conducting substance. The parent bee, therefore, after having constructed the cells, laid an egg in each, and filled them with a store of suitable food, plasters them with a covering of vermiform masses, apparently composed of honey and pollen; and having done this, aware (long before Count Rumford's experiments) what materials conduct heat most slowly, she attacks the woolly leaves of *Stachy's lanata*, *Agrostemma coronaria*, and similar plants, and with her mandibles industriously scrapes off the wool, which with her fore legs she rolls into a little ball, and carries to her nest. This wool she sticks upon the plaster that covers her cells, and thus closely envelopes them with a warm coating of down, impervious to every change of temperature.

THE CARPENTER BEE.—A numerous family of wild bees may properly be compared to carpenters, boring with incredible labour, out of the solid wood, long cylindrical tubes, and dividing them into various cells. Amongst these, one of the most remarkable is the *Apis violacea*, L. (*Xylacopa*, Latr.) a large species, a native of southern Europe, distinguished by beautiful wings of a deep violet colour, and found commonly in gardens, in the upright putrescent espaliers, or vine props, of which, and occasionally in the garden seats, doors, and window-shutters, she makes her nest. In the beginning of spring, after repeated and careful surveys, she fixes upon a piece of wood suitable for her purpose, and with her strong mandibles begins the process of boring. First proceeding obliquely downwards, she soon points her course in a direction parallel with the sides of the wood, and at length with unwearied exertion forms a cylindrical hole or tunnel not less than twelve or fifteen inches long, and half an inch broad. Sometimes, where the diameter will admit of it, three or four of these pipes, nearly parallel with each other, are bored in the same piece. Herculean as this task (which is the labour of several days) appears, it is but a small part of what our industrious bee cheerfully undertakes. As yet she has completed, but the shell of the destined habitation of her offspring; each of which, to the number of ten or twelve, will require a separate and distinct apartment. In excavating her tunnel, she has detached a large quantity of fibres, which lie on the ground like a heap of saw-dust. This material supplies all her wants. Having deposited an egg at the bottom of the cylinder, along with the requisite store of pollen and honey, she next, at the height of about three-quarters of an inch, (which is the depth of each cell,) constructs of particles of the saw-dust glued together, and also to the sides of

the tunnel, what may be called an annular stage or scaffolding. When this is sufficiently hardened, its interior edge affords support for a second ring of the same materials, and thus the ceiling is gradually formed of these concentric circles, till there remains only a small orifice in its centre, which is also closed with a circular mass of agglutinated particles of sawdust. When this partition, which serves as the ceiling of the first cell, and the flooring of the second, is finished, it is about the thickness of a crown piece, and exhibits the appearance of as many concentric circles as the animal has made pauses in her labour. One cell being finished, she proceeds to another, which she furnishes and completes in the same manner, and so on, until she has divided her whole tunnel into ten or twelve apartments.

Such a laborious undertaking as the constructing and furnishing these cells, cannot be the work of one, or even of two days. Considering that every cell requires a store of honey and pollen, not to be collected but with long toil, and that a considerable interval must be spent in agglutinating the floors of each, it will be very obvious that the last egg in the last cell must be laid many days after the first. We are certain, therefore, that the first egg will become a grub, and consequently a perfect bee, many days before the last. What then becomes of it? It is impossible that it should make its escape though eleven superincumbent cells, without destroying the immature tenants; and it seems equally impossible that it should remain patiently in confinement below them until they are all disclosed. This dilemma our heaven-taught architect has provided against. With forethought, never enough to be admired, she has not constructed her tunnel with one opening only, but at the farther end has pierced another orifice, a kind of back door, through which the insects produced by the first-laid eggs successively emerge into day. In fact, all the young bees, even the uppermost, go out by this road; for, by an exquisite instinct, each grub, when about to become a pupa, places itself in its cell, with its head downwards, and thus is necessitated, when arrived at its last state, to pierce its cell in this direction.

We shall now describe **THE MASON-BEE**.—There is a family of wild bees which carry on the trade of masons, building their solid houses solely of artificial stone. The first step of the mother bee, *Apis mururia*, Oliv. (*Anthophara*, F. *Megachile*, Latr.) is to fix upon a proper situation for the future mansion of her offspring. For this she usually selects an angle, sheltered by any projection, on the south side of a stone wall. Her next care is to provide materials for the structure. The chief of these is sand, which she carefully selects, grain by

grain, from such as contain some mixture of earth; these grains she glues together with her viscid saliva into masses the size of small shot,* and transports by means of her jaws to the site of her castle. With a number of these masses, which are the artificial stone of which her building is to be composed, united by a cement preferable to ours, she first forms the basis or foundation of the whole. Next she raises the walls of a cell, which is an inch long and half an inch broad, and, before its orifice is closed, in form resembles a thimble. This, after depositing an egg, and a supply of honey and pollen, she covers in, and then proceeds to the erection of a second, which she finishes in the same manner, until the whole number, which varies from four to eight, is completed. The vacuities between the cells, which are not placed in any regular order, some being parallel to the wall, others being perpendicular to it, and others inclined to it at different angles, this laborious architect fills up with the same material of which the cells are composed, and then bestows upon the whole group a common covering of coarser grains of sand. The form of the whole nest, which, when finished, is a solid mass of stone, so hard as not to be easily penetrated with the blade of a knife, is an irregular oblong, of the same colour as the sand, and, to a casual observer, more resembling a splash of mud than an artificial structure. These bees sometimes are more economical of their labour, and repair old nests, for the possession of which they have very desperate combats. One would have supposed that the inhabitants of a castle so fortified might defy the attack of an insect marauder. Yet an ichneumon, and a beetle (*Clerius apiarius*, F.) both contrive to introduce their eggs into the cells, and the larvæ proceeding from them devour their inhabitants.—*Reaum.* vi. 57, 58 *Mon. Ap. Angl.* i. 179.

Other bees of the same family use different materials in the construction of their nests. Some employ fine earth made into a kind of mortar made with gluten. Another, (*A. cærulescens*, L.) as we learn from De Geer, forms its nest of argillaceous earth, mixed with chalk, upon stone walls, and sometimes probably builds in chalk-pits. *Apis bicornis*, L. selects the hollows of large stones for the site of its dwelling; whilst others prefer the holes in wood.

WE now proceed to THE UPHOLSTERER-BEE.—Such may those be denominated which line the holes excavated in the earth for the reception of their young, with an elegant coating

* Reaumur plausibly supposes, that it has been from observing this bee thus loaded, that the tale mentioned by Aristotle and Pliny, of the five-bee's ballasting itself with a bit of stone, previous to flying home in a high wind, has arisen.

of flowers or of leaves. Amongst the most interesting of these is *Apis Papaveris*, (*Megachile*, Latr., *Anthophora*, F.) a species whose manners have been admirably described by Reaumur. This little bee, as though fascinated with the colour most attractive to our eyes, invariably chooses for the hangings of her apartments the most brilliant scarlet, selecting for its material the petals of the wild poppy, which she dexterously cuts into the proper form. Her first process is to excavate in some pathway a burrow, cylindrical at the entrance, but swelled out below, to the depth of about three inches. Having polished the walls of this little apartment, she next flies to a neighbouring field, cuts out oval portions of the flowers of poppies, seizes them between her legs, and returns with them to her cell; and though separated from the wrinkled petal of a half-expanded flower, she knows how to straighten their folds, and, if too large, to fit them for her purpose by cutting off the superfluous parts. Beginning at the bottom, she overlays the walls of her mansion with this brilliant tapestry, extending it also on the surface of the ground round the margin of the orifice. The bottom is rendered warm by three or four coats, and the sides have never less than two. The little upholsterer, having completed the hangings of her apartment, next fills it with pollen and honey to the height of about half an inch; then, after committing an egg to it, she wraps over the poppy lining, so that even the roof may leave this material; and lastly, closes its mouth with a small hillock of earth. —*Reaum.* 6. 139 to 148. The great depth of the cell, compared with the space which the single egg and the accompanying food deposited in it occupy, deserves particular notice. This is not more than half an inch at the bottom, the remaining two inches and a half being subsequently filled with earth.

THE LEAF-CUTTER BEE.—There is a species of wild bee, that cover the walls of their cells with coatings of sober-coloured materials, generally selecting for their hangings the leaves of trees, especially of the rose, whence they have been known by the name of the leaf-cutter bees. They differ also from *A. Papaveris* in excavating longer burrows, and filling them with several thimble-shaped cells, composed of portions of leaves so curiously convoluted, that, if we were ignorant in what school they have been taught to construct them, we should never credit their being the work of an insect. Their entertaining history, so long ago as 1670, attracted the attention of our countrymen, Ray, Lister, Willoughby, and Sir Edw. King; but we are indebted for the most complete account of the procedure, to Reaumur.

The mother bee first excavates a cylindrical hole eight or ten inches long, in a horizontal direction, either in the

ground or in the trunk of a rotten willow-tree, or occasionally in other decaying wood. This cavity she fills with six or seven cells, wholly composed of portions of leaf in the shape of a thimble, the convex end of one closely fitting into the open end of another. Her first process is to form the exterior coating, which is composed of three or four pieces, of larger dimensions than the rest, and of an oval form. The second coating is formed of portions of equal size, narrow at one end, but gradually widening towards the other, where the width equals half the length. One side of these pieces is the serrate margin of the leaf from which it was taken, which, as the pieces are made to lap one over the other, is kept on the outside, and that which has been cut within. The little animal now forms a third coating of similar materials, the middle of which, as the most skilful workman would do in similar circumstances, she places over the margins of those that form the first tube, thus covering and strengthening the junctures. Repeating the same process, she gives a fourth and sometimes a fifth coating to her nest, taking care, at the closed end or narrow extremity of the cell, to bend the leaves so as to form a convex termination. Having thus finished a cell, her next business is to fill it, to within half a line of the orifice, with a rose-coloured conserve, composed of honey and pollen, usually collected from the flowers of thistles; and then having deposited her egg, she closes the orifice with three pieces of leaf so exactly circular, that a pair of compasses could not define their margin with more truth, and coinciding so precisely with the walls of the cell, as to be retained in their situation merely by the nicety of their adaptation. After this covering is fitted in, there remains still a concavity, which receives the convex end of the succeeding cell; and in this manner the indefatigable little animal proceeds until she has completed the six or seven cells composing her cylinder.

The process which one of these bees employs in cutting the pieces of leaf that compose her nest, is worthy of attention. Nothing can be more expeditious; she is not longer about it than we should be with a pair of scissors. After hovering for some moments over a rose bush, as if to reconnoitre the ground, the bee alights upon the leaf which she has selected, usually taking her station upon its edge, so that the margin passes between her legs. With her strong mandibles she cuts without intermission in a curve line, so as to detach a triangular portion. When this hangs by the last fibre, lest its weight should carry her to the ground, she balances her little wings for flight, and the very moment it parts from the leaf, flies off with it in triumph; the detached portion remaining bent between her legs in a direction perpendicular to her body. Thus without rule or compasses do these diminutive creatures

mete out the materials of their work into portions of an ellipse, into ovals or circles, accurately accommodating the dimensions of the several pieces of each figure to each other. What other architect could carry impressed upon the tablet of his memory the entire idea of the edifice which he has to erect, and, destitute of square or plumb-line, cut out his materials in their exact dimensions without making a single mistake? Yet this is what our little bee invariably does. So far are human art and reason excelled by the teaching of the Almighty.—*Reaumur* vi. 971—94. *Mor. Ap. Angl.* i. 157. *Apis* c. 2.

A CURIOUS ACCOUNT OF AN IDIOT BOY, AND BEES.—Mr White has given the following curious account of an idiot boy. From a child he shewed a strong propensity to bees. They were his food, his amusement, his sole object. In the winter he dozed away his time in his father's house, by the fire-side, in a torpid state, seldom leaving the chimney-corner: but in summer he was all alert, and in quest of his game. Hive-bees, humble-bees, and wasps, were his prey, wherever he found them. He had no apprehension from their stings, but would seize them with naked hands, and at once disarm them of their weapons, and suck their bodies for the sake of their honey-bags. Sometimes he would fill his bosom between his shirt and skin with these insects; and sometimes he endeavoured to confine them in bottles. He was very injurious to men that kept bees, for he would glide into their bee-gardens, and, sitting down before the stools, would rap with his fingers, and so take the bees as they came out. He has even been known to overturn the hives for the sake of the honey, of which he was passionately fond. Where metheglin was making, he would linger round the tubs and vessels, begging a draught of what he called bee-wine. As he ran about, he used to make a humming noise with his lips, resembling the buzzing of bees. This lad was lean and sallow, and of a cadaverous complexion; and, except in his favourite pursuit, in which he was wonderfully adroit, discovered no manner of understanding. Had his capacity been better, and directed to the same object, he had perhaps abated much of our wonder at the feats of a more modern exhibiter of bees; and we may justly say of him now,

Had thy presiding star propitio-
Shouldst Wildman be.

Tho-
White's Natural History.

We conclude this chapter with an explanation of the preceding lines.

MR. WILDMAN'S CURIOUS EXHIBITIONS OF BEES.—Mr. Wildman, by his dexterity in the management of bees, some

years ago, surprised the whole kingdom. He caused swarms to light where he pleased, almost instantaneously; he ordered them to settle on his head, then removed them to his hand, and commanded them to settle on a window, table, &c. at pleasure. We subjoin the method of performing these feats, in his own words: "Long experience has taught me, that as soon as I turn up a hive, and give it some taps on the sides and bottom, the queen immediately appears, to know the cause of this alarm; but soon retires again among her people. Being accustomed to see her so often, I readily perceive her at first glance; and long practice has enabled me to seize her instantly, with a tenderness that does not in the least endanger her person. This is of the utmost importance; for the least injury done to her brings immediate destruction to the hive, if you have not a spare queen to put in her place, as I have too often experienced in my first attempts. When possessed of her, I can, without injury to her, or exciting that degree of resentment that may tempt her to sting me, slip her into my other hand, and, returning the hive to its place, hold her there, till the bees missing her, are all on wing, and in the utmost confusion. When the bees are thus distressed, I place the queen wherever I would have the bees to settle. The moment a few of them discover her, they give notice to those near them, and those to the rest; the knowledge of which becomes so general, that in a few minutes they all collect themselves round her, and are so happy in having recovered this sole support of their state, that they will long remain quiet in their situation: nay, the scent of her body is so attractive of them, that the slightest touch of her along any place or substance, will attach the bees to it, and induce them to any path she takes."—This was the only witchcraft used by Mr. Wildman, and is that alone which is practised by others who have since made similar exhibitions.

CHAP. XXIV.

CURIOSITIES RESPECTING INSECTS.—(*Continued.*)*The Wasp.*

The laws of life, why need I call to mind,
 Obey'd by insects, too, of ev'ry kind!
 Of these, none uncontroll'd and lawless rove,
 But to some destin'd end spontaneous move:
 Led by that instinct Heav'n itself inspires,
 Or so much reason as their state requires.
 See all with skill acquire their daily food,
 All use those arms which nature has bestow'd;
 Produce their tender progeny, and feed
 With care parental, while that care they need.
 In these lov'd offices completely blest,
 No hopes beyond them, nor vain fears molest. *Jenyns.*

FOR the following account of the WASP, we are indebted to Kirby and Spence; and we take this opportunity of making a general acknowledgment of our obligations to those gentlemen, for the assistance we have derived from their highly interesting treatise, in drawing up this account of the curiosities respecting insects.

Compared with hive-bees, wasps may be considered as a horde of thieves and rascals: while the bees are peaceful, honest, and industrious subjects; the wasps attack their persons, and plunder their property. Yet, with all this love of pillage and other bad propensities, they are not altogether disagreeable or unamiable; they are brisk and lively; they do not usually attack unprovoked; and their object in plundering us is not purely selfish, but is principally to provide for the support of the young brood of their colonies.

The societies of wasps, like those of ants, and other social *Hymenoptera*, consist of females, males, and workers. The females may be considered as of two sorts: first, the females, by way of eminence, are much larger than any other individuals of the community; they equal six of the workers (from which in other respects they do not materially differ) in weight, and lay both male and female eggs: then the small females, not larger than the workers, which lay only male eggs. This last description of females, which are found also both amongst the humble-bees and hive-bees, were first observed among wasps, by M. Perrot, a friend of Huber's. The large females are produced later than the workers, and make their appearance in the next spring; and whoever then destroys one of them, destroys an entire colony, of which she would be the founder.

Different from the queen-bee, the female wasp is at first an insulated being, that has had the fortune to survive the rigours

of winter. When in the spring she lays the foundation of her future empire, she has not a single worker at her disposal; with her own hands and teeth she often hollows out a cave wherein she may lay the first foundations of her paper metropolis: she must herself build the first houses, and produce from her own body their first inhabitants; which in their infant state she must feed and educate, before they can assist her in her great design. At length she receives the reward of her perseverance and labour; and from being a solitary unconnected individual, in the autumn is enabled to rival the queen of the hive in the number of her children and subjects, and in the edifices which they inhabit—the number of cells in a vespiary sometimes amounting to more than sixteen thousand, almost all of which contain either an egg, a grub, or a pupa, and each cell serving for three generations in a year; which, after making every allowance for failures and other casualties, will give a population of at least thirty thousand. Even at this time, when she has so numerous an army of coadjutors, the industry of this creature does not cease, but she continues to set an example of diligence to the rest of the community. If by any accident, before the other females are hatched, the queen-mother perishes, the neuters cease their labours, lose their instincts, and die.

The number of females in a populous vespiary is considerable, amounting to several hundreds; they emerge from the pupa about the latter end of August, at the same time with the males, and fly in September and October, when they pair. Of this large number of females, very few survive the winter. Those that are so fortunate, remain torpid till the vernal sun recalls them to life and action. They then fly forth, collect provision for their young brood, and are engaged in the other labours necessary for laying the foundation of their empire; but in the summer months they are never seen out of the nest.

The male wasps are much smaller than the female, but they weigh as much as two workers. Their antennæ are longer than those of either, not, like theirs, thicker at the end, but perfectly filiform; and their abdomen is distinguished by an additional segment. Their numbers about equal those of the females, and they are produced at the same time. They are not so wholly given to pleasure and idleness as the drones of the hive. They do not, indeed, assist in building the nest, and in the care of the young brood; but they are the scavengers of the community, for they sweep the passages and streets, and carry off all the filth. They also remove the bodies of the dead, which are sometimes heavy burdens for them; in which case two unite their strength, to accomplish the work; or, if a partner be not at hand, the wasp thus employed cuts off the

need of the defunct, and so effects its purpose. As they make themselves so useful, they are not, like the male bees, devoted by the workers to an universal massacre when the great end of their creation is answered; but they share the general lot of the community, and are suffered to survive till the cold cuts off them and the workers together.

The workers are the most numerous, and to us the only troublesome part of the community; upon whom devolves the main business of the nest. In the summer and autumnal months they go forth by myriads into the neighbouring country to collect provisions; and on their return to the common den, after reserving a sufficiency for the nutriment of the young brood, they divide the spoil with great impartiality; part being given to the females, part to the males, and part to those workers that have been engaged in extending and fortifying the vespiary. This division is voluntarily made, without the slightest symptom of compulsion. Several wasps assemble round each of the returning workers, and receive their respective portions. It is curious and interesting to observe their motions on this occasion. As soon as a wasp that has been filling itself with the juice of fruits arrives at the nest, it perches upon the top, and, disgorging a drop of its saccharine fluid, is attended sometimes by two at once, who share the treasure; this being thus distributed, a second, and sometimes a third drop, is produced, which falls to the lot of others.

Wasps, though ferocious and cruel towards their fellow-insects, are civilized and polished in their intercourse with each other, and form a community whose architectural labours will not suffer on comparison even with those of the peaceful inhabitants of a bee-hive. Like these, the great object of their industry is the erection of a structure for their beloved progeny, towards which they discover the greatest affection and tenderness, and, like bees, construct combs consisting of hexagonal cells for their reception; but the substance which they make use of is very dissimilar to the wax employed by bees, and the general plan of their city differs in many respects from that of a bee-hive. The common wasp's nest, usually situated in a cavity under ground, is of an oval figure, about sixteen or eighteen inches long, by twelve or thirteen broad. Externally, it is surrounded by a thick coating of numerous leaves of a sort of grayish paper, which do not touch each other, but have a small interval between each, so that if the rain should chance to penetrate one or two of them, its progress is speedily arrested. On removing this external covering, we perceive that the interior consists of from twelve to sixteen circular combs of different sizes, not ranged vertically, as in a bee-hive, but horizontally, so as to form so many distinct and parallel

stories. Each comb is composed of a numerous assemblage of hexagonal cells, formed of the same paper-like substance as the exterior covering of the nest, and, according to a discovery of Dr. Barclay, each, as in those of bees, a distinct cell, the partition walls being double.—*Memoirs of the Wernerian Society*, ii. 260. These cells, which, as wasps do not store up any food, serve merely as the habitations of their young, are not, like those of the honey-bee, arranged in two opposite layers, but in one only, their entrance being always downwards: consequently the upper part of the comb, composed of the bases of the cells, which are not pyramidal, but slightly convex, forms a nearly level floor, on which the inhabitants can conveniently pass and repass, spaces of about half an inch high being left between each comb. Although the combs are fixed to the sides of the nest, they would not be sufficiently strong without further support. The ingenious builders, therefore, connect each comb to that below it by a number of strong cylindrical columns or pillars, having, according to the rules of architecture, their base and capital wider than the shaft, and composed of the same paper-like material used in other parts of the nest, but of a more compact substance. The middle combs are connected by a rustic colonnade of from forty to fifty of these pillars; the upper and lower combs by a smaller number.

The cells are of different sizes, corresponding to that of the three orders of individuals which compose the community; the largest for the grubs of females, the smallest for those of workers. The last always occupy an entire comb, while the cells of the males and females are often intermixed. Besides openings which are left between the walls of the combs to admit of access from one to the other, there are at the bottom of each nest two holes, by one of which the wasps uniformly enter, and through the other issue from the nest, and thus avoid all confusion or interruption of their common labours. As the nest is often a foot and a half under ground, it is requisite that a covered way should lead to its entrance. This is excavated by the wasps, who are excellent miners, and is often very long and tortuous, forming a beaten road to the subterranean city, well known to the inhabitants, though its entrance is concealed from curious eyes. The cavity itself, which contains the nest, is either the abandoned habitation of moles or field-mice, or a cavern purposely dug out by the wasps, which exert themselves with such industry as to accomplish the arduous undertaking in a few days.

When the cavity and entrance to it are completed, the next part of the process is to lay the foundations of the city to be included in it, which, contrary to the usual customs of builders, wasps begin at the top, continuing downwards. It has already

been observed, that the coatings which compose the dome, are a sort of rough but thin paper, and that the rest of the nest is composed of the same substance variously applied. "Whence do the wasps derive it?" They are manufacturers of the article, and prepare it from a material even more singular than any of those which have of late been proposed for this purpose; namely, the fibres of wood. These they detach by means of their jaws from window-frames, posts, and rails, &c. and, when they have amassed a heap of the filaments, moisten the whole with a few drops of a viscid glue from their mouth, and, kneading it with their jaws into a sort of paste, or *papier mâché*, fly off with it to their nest. This ductile mass they attach to that part of the building upon which they are at work, walking backwards, and spreading it into laminæ of the requisite thinness by means of their jaws, tongue, and legs. This operation is repeated several times, until at length, by aid of fresh supplies of the material, and the combined exertions of so many workmen, the proper number of layers of paper, that are to compose the roof, is finished. This paper is as thin as the leaf you are reading; and you may form an idea of the labour which even the exterior of a wasp's nest requires, on being told that no fewer than fifteen or sixteen sheets of it are usually placed above each other, with slight intervening spaces, making the whole upwards of an inch and a half in thickness. When the dome is completed, the uppermost comb is next begun, in which, as well as all the other parts of the building, precisely the same material and the same process, with little variation, are employed. In the structure of the connecting pillars, there seems a greater quantity of glue made use of than in the rest of the work, doubtless with the view of giving them superior solidity. When the first comb is finished, the continuation of the roof or walls of the building is brought down lower; a new comb is erected; and thus the work successively proceeds until the whole is finished. As a comparatively small proportion of the society is engaged in constructing the nest, its entire completion is the work of several months: yet, though the fruit of such severe labour, it has scarcely been finished a few weeks before winter comes on, when it merely serves for the abode of a few benumbed females, and is entirely abandoned at the approach of spring, as wasps are never known to use the same nest for more than one season.

There is good reason for thinking, and the opinion had the sanction of the late Sir Joseph Banks, that wasps have sentinels placed at the entrances of their nests, which, if you can once seize and destroy, the remainder will not attack you. This is confirmed by an observation of Mr. Knight, in the *Philosophical Transactions*, (vol. I. 2d Ed. p. 505;) that if a

nest of wasps be approached without alarming the inhabitants, and all communication be suddenly cut off between those out of the nest and those within it, no provocation will induce the former to defend it and themselves. But if one escapes from within, it comes with a very different temper, and appears commissioned to avenge public wrongs, and prepared to sacrifice its life in the execution of its orders. He discovered this when quite a boy.

In October, wasps seem to become less savage and sanguinary; for even flies, of which, earlier in the summer, they are the pitiless destroyers, may be seen to enter their nests with impunity. It is then, probably, that they begin to be first affected by the approach of the cold season, when nature teaches them it is useless longer to attend to their young. They themselves all perish, except a few of the females, upon the first attack of frost.

Reaumur, from whom most of these observations are taken, put the nests of wasps under glass hives, and succeeded so effectually in reconciling these little restless creatures to them, that they carried on their various works under his eye.



CHAP. XXV.

CURIOSITIES RESPECTING INSECTS.—(Continued.)

Ants—White Ants—Green Ants—Visiting Ants—The Ant-Lion

These emmets, how little they are in our eyes!
We tread them to dust, and a troop of them dies

Without our regard or concern:

Yet, as wise as we are, if we went to their school,
There's many a sluggard, and many a fool,

A lesson of wisdom might learn.

Watts

THE societies of ANTS, as also of other *Hymenoptera*, differ from those of the Termites, in having inactive larvæ and pupæ, the neuter, or workers, combining in themselves both the military and civil functions. Besides the helpless larvæ and pupæ, which have no locomotive powers, these societies consist of females and workers. The office of the females, at their first exclusion distinguished by a pair of ample wings, (which however, they soon cast,) is the foundation of new colonies, and the furnishing of a constant supply of eggs, for the maintenance of the population in the old nests, as well as in the new. These are usually the least numerous part of the community.

Gould indeed says, that the males and females are nearly equal in number, p. 62; but from Huber's observations it seems to follow that the former are the most numerous, p. 96.

Upon the workers devolves, except in nascent colonies, all the work, at well as the defence of the community, of which they are the most numerous portion.

In the warm days that occur from the end of July to the beginning of September, and sometimes later, the habitations of the various species of ants may be seen to swarm with winged insects, which are the males and females, preparing to quit for ever the scene of their nativity and education. Every thing is in motion: and the silver wings, contrasted with the jet bodies which compose the animated mass, add a degree of splendour to the interesting scene. The bustle increases, till at length the males rise, as it were by a general impulse, into the air, and the females accompany them. The whole swarm alternately rises and falls with a slow movement to the height of about ten feet, the males flying obliquely with a rapid zigzag motion; and the females, though they follow the general movement of the column, appearing suspended in the air, like balloons, seemingly with no individual motion, and having their heads turned towards the wind.

Sometimes the swarms of a whole district unite their infinite myriads, and, seen at a distance, produce an effect resembling the flashing of an aurora borealis. Rising with incredible velocity in distinct columns, they soar above the clouds. Each column looks like a kind of slender net-work, and has a tremulous undulating motion, which has been observed to be produced by the regular alternate rising and falling just alluded to. The noise emitted by myriads and myriads of these creatures, does not exceed the hum of a single wasp. The slightest zephyr disperses them; and if in their progress they chance to be over your head, if you walk slowly on, they will accompany you, and regulate their motions by yours.

Captain Haverfield, R. N. gives an account of an extraordinary appearance of ants observed by him in the Medway, in the autumn of 1814, when he was first-lieutenant of the *Clorinde*; which is confirmed by the following letter, addressed by the surgeon of that ship, now Dr. Bromley, to Mr. Mac Leay.

"In September, 1814, being on the deck of the *bulk* to the *Clorinde*, my attention was drawn to the water by the first-lieutenant (Haverfield) observing there was something black floating down with the tide. On looking with a glass, I discovered they were insects. The boat was sent, and brought a bucket full of them on board; they proved to be a large species of ant, and extended from the upper part of Salt-pan Reach out towards the Great Nore, a distance of five or six

miles. The column appeared to be in breadth eight or ten feet, and in height about six inches, which I suppose must have been from their resting one upon another." Purchas seems to have witnessed a similar phenomenon on shore. "Other sorts (of ants)," says he, "there are many, of which some become winged, and fill the air with swarms, which sometimes happens in England. On Bartholomew-day, 1613, I was in the island of Foulness, on our Essex shore, where were such clouds of these flying pismires, that we could no where flee from them, but they filled our clothes; yea, the floors of some houses where they fell were in a manner covered with a black carpet of creeping ants; which, they say, drown themselves about that time of the year in the sea."—*Pilgrimage*, 1090. These ants were winged; but whence this immense column came, was not ascertained. From the numbers here accumulated, one would think that all the ant-hills of the counties of Kent and Surrey could scarcely have furnished a sufficient number of males and females to form it.

When Colonel Sir Augustus Frazer, of the Horse Artillery, was surveying, on the 6th of October, 1813, the scene of the battle of the Pyrenees, from the summit of the mountain called Pena de Aya, or Les Quatre Couronnes, he and his friends were enveloped with a swarm of ants, so numerous as entirely to intercept their view, so that they were glad to remove to another station, in order to get rid of these troublesome little creatures.

The females that escape from the injury of the elements and their various enemies, become the founders of new colonies, doing all the work that is usually done by the neuters. M. P. Huber has found incipient colonies,* in which were only a few workers engaged with their mother in the care of a small number of larvæ; and M. Perrot, his friend, once discovered a small nest, occupied by a solitary female, who was attending upon four pupa only. Such is the foundation and first establishment of those populous nations of ants with which we every where meet.

But though the majority of females produced in a nest probably thus desert it, all are not allowed this liberty. The prudent workers are taught by their instinct, that the existence of their community depends upon the presence of a sufficient number of females. Some, therefore, that are fecundated in or near the spot, they forcibly detain, pulling off their wings, and keeping them prisoners till they are ready to lay their eggs, or are reconciled to their fate. De Geer, in a nest of *F. rufa*,

* M. Huber observes, that fecundated females, after they have lost their wings, make themselves a subterranean cell, some singly, others in common. From which it appears that some colonies have more than one female from their first establishment.

observed that the workers compelled some females that were come out of the nest to re-enter it; (vol. ii. 1071.)—and from M. P. Huber we learn, that, being seized at the moment of fecundation, they are conducted into the interior of the formicary, when they become entirely dependent upon the neuter, who, hanging pertinaciously to each leg, prevent their going out, but at the same time attend upon them with the greatest care, feeding them regularly, and conducting them where the temperature is suitable to them, but never quitting them a single moment. By degrees these females become reconciled to their condition, and lose all desire of making their escape; their abdomen enlarges, and they are no longer detained as prisoners, yet each is still attended by a body-guard, a single ant, which always accompanies her, and prevents her wants. Its station is remarkable, being mounted upon her abdomen, with its posterior legs upon the ground. These sentinels are constantly relieved; and to watch the moment when the female begins the important work of oviposition, and carry off the eggs, of which she lays four or five thousand or more in the course of the year, seems to be their principal office.

When the female is acknowledged as a mother, the workers begin to pay her a homage very similar to that which the bees render to their queen. All press round her, offer her food, conduct her by her mandibles through the difficult or steep passages of the formicary; nay, they sometimes even carry her about their city: she is then suspended upon their jaws, the ends of which are crossed; and, being coiled up like the tongue of a butterfly, she is packed so close as to incommode the carrier but little. When these set her down, others surround and caress her, one after another tapping her on the head with their antennæ.

“In whatever apartment (says Gould) a queen condescends to be present, she commands obedience and respect. A universal gladness spreads itself through the whole cell, which is expressed by particular acts of joy and exultation. They have a particular way of skipping, leaping, and standing upon their hind-legs, and prancing with the others. These frolics they make use of, both to congratulate each other when they meet, and to shew their regard for the queen: some of them walk gently over her, others dance round her; she is generally encircled with a cluster of attendants, who, if you separate them from her, soon collect themselves into a body, and inclose her in the midst.” Nay, even if she dies, as if they were unwilling to believe it, they continue sometimes for months the same attentions to her, and treat her with the same courtly formality as if she were alive, and they will brush her and lick her incessantly.

That the ants, though they are mute animals, have the means of communicating to each other information of various occurrences, and use a kind of language which is mutually understood, will appear evident from the following facts.

If those at the surface of a nest are alarmed, it is wonderful in how short a time the alarm spreads through the whole nest. It runs from quarter to quarter; the greatest inquietude seems to possess the community; and they carry with all possible dispatch their treasures, the larvæ and pupæ, down to the lowest apartments. Amongst those species of ants that do not go much from home, sentinels seem to be stationed at the avenues of their city. "Disturbing once the little heaps of earth thrown up at the entrances into the nest of *F. flava*, which is of this description, (says Huber,) I was struck by observing a single ant immediately come out, as if to see what was the matter, and this three separate times."

The *F. herculeana*, *L.* inhabits the trunks of hollow trees on the Continent, for it has not yet been found in England, upon which they are often passing to and fro. M. Huber observed, that when he disturbed those that were at the greatest distance from the rest, they ran towards them, and, striking their heads against them, communicated their cause of fear or anger; that these, in their turn, conveyed in the same way the intelligence to others, till the whole colony was in a ferment, those neuters which were within the tree running out in crowds to join their companions in the defence of their habitation. The same signals that excited the courage of the neuters, produced fear in the males and females, which, as soon as the news of the danger was thus communicated to them, retreated into the tree as to an asylum.

The legs of one of this gentleman's artificial formicaries were plunged into pans of water, to prevent the escape of the ants; this proved a source of great enjoyment to these little beings, for they are a very thirsty race, and lap water like dogs.—(*Gould*, 92. *De Geer*, ii. 1087. *Huber*, 5, 132.) One day, when he observed many of them tippling very merrily, he was so cruel as to disturb them, which sent most of the ants in a fright to the nest; but some, more thirsty than the rest, continued their potations: upon this, one of those that had retreated, returns to inform his thoughtless companions of their danger; one he pushes with his jaws; another he strikes first upon the belly, and then upon the breast; and so obliges three of them to leave off their carousing, and march homewards; but the fourth, more resolute to drink it out, is not to be discomfited, and pays not the least regard to the kind blows with which his compeer, solicitous for his safety, repeatedly belabours him; at length, determined to have his way, he seizes him by one of his hind-legs, and gives him a

violent pull : upon this, leaving his liquor, the loiterer turns round, and opening his threatening jaws with every appearance of anger, goes very coolly to drinking again ; but his monitor, without further ceremony, rushing before him, seizes him by his jaws, and at last drags him off in triumph to the formicary.—*Huber*, 133.

The language of ants, however, is not confined merely to giving intelligence of the approach or presence of danger ; it is also co-extensive with all their other occasions for communicating their ideas to each other, or holding any intercourse. Some engage in military expeditions, and often previously send out spies, to collect information. These, as soon as they return from exploring the vicinity, enter the nest ; upon which, as if they had communicated their intelligence, the army immediately assembles in the suburbs of their city, and begins its march towards that quarter whence the spies had arrived. Upon the march, communications are perpetually making between the van and the rear ; and when arrived at the camp of the enemy, and the battle begins, if necessary, couriers are dispatched to the formicary for reinforcements.—*Huber*, 167, 217, 237.

If you scatter the ruins of an ant's nest in your apartment, you will be furnished with another proof of their language. The ants will take a thousand different paths, each going by itself, to increase the chance of discovery ; they will meet and cross each other in all directions, and perhaps will wander long before they can find a spot convenient for their re-union. No sooner does any one discover a little chink in the floor, through which it can pass below, than it returns to its companions, and, by means of certain motions of its antennæ, makes some of them comprehend what route they are to pursue to find it, sometimes even accompanying them to the spot ; these, in their turn, become the guides of others, till all know which way to direct their steps.—*Huber*, 137.

It is well known also, that ants give each other information when they have discovered any store of provision. *Bradley* relates a striking instance of this. A nest of ants in a nobleman's garden discovered a closet, many yards within the house, in which preserves were kept, which they constantly attended till the nest was destroyed. Some in their rambles must have first discovered this depôt of sweets, and informed the rest of it. It is remarkable that they always went to it by the same track, scarcely varying an inch from it, though they had to pass through two apartments ; nor could the sweeping and cleaning of the rooms discomfit them, or cause them to pursue a different route.—*Bradley*, 134.

Here may be related a very amusing experiment of *Gould's*. Having deposited several colonies of ants (*F. fusca*) in flower-

pots, he placed them in some earthen pans of water, which prevented them from making excursions from their nest. When they had been accustomed some days to this imprisonment, he fastened small threads to the upper part of the pots, and extending them over the water-pans, fixed them in the ground. The sagacious ants soon found out that by these bridges they could escape from their moated castle. The discovery was communicated to the whole society, and in a short time the threads were filled with trains of busyworkers passing to and fro.—*Gould*, 85.

Legion's account of the ants in Barbadoes, affords another most convincing proof of this: as he has told his tale in a very lively and interesting manner, it shall be given nearly in his own words.

"The next of these moving little animals are ants, or pismires: these are but of a small size, but great in industry; and that which gives them means to attain to this end is, they have all one soul. If I should say they are here or there, I should do them wrong, for they are every where:—underground, where any hollow or loose earth is; amongst the roots of trees; upon the bodies, branches, leaves, and fruit of all trees: in all places without the houses and within; upon the sides, walls, windows, and roofs, without; and on the floors, side-walls, ceilings, and windows, within; tables, cupboards, beds, stools, all are covered with them, so that they are a kind of ubiquitaries. We sometimes kill a cockroach, and throw him on the ground; and mark what they will do with him. His body is bigger than a hundred of them, and yet they will find the means to take hold of him, and lift him up; and having him above ground, away they carry him, and some go by as ready assistants, if any be weary; and some are the officers that lead and shew the way to the hole into which he must pass; and if the vancouriers perceive that the body of the cockroach lies across, and will not pass through the hole or arch through which they mean to carry him, order is given, and the body turned endwise, and this is done a foot before they come to the hole, and that without any stop or stay; and it is observable, that they never pull contrary ways. A table being cleared with great care, (by way of experiment,) of all the ants that are upon it, and sugar being put upon it, some, after a circuitous route, will be observed to arrive at it; and again departing, without tasting the treasure, will hasten away to inform their friends of the discovery, who, upon this, will come by myriads: you may then, while they are thickest upon the table, clap a large book, or any thing fit for that purpose, upon them, so hard as to kill all that are under it; and when you have done so, take away the book, and leave them to themselves but a quarter of an hour, and

when you come again, you shall find all these bodies carried away.—Other trials we make of their ingenuity, as thus: Take a pewter dish, and fill it half full of water, into which put a little gallipot filled with sugar, and the ants will presently find it, and come upon the table, but when they perceive it environed with water, they try about the brims of the dish where the gallipot is nearest; and there the most venturous amongst them commits himself to the water, though he be conscious how bad a swimmer he is, and is drowned in the adventure; the next is not warned by his example, but ventures too, and is alike drowned; and many more, so that there is a small foundation of their bodies to venture; and then they come faster than ever, and so make a bridge of their own bodies.”—*Hist. of Barbadoes*, p. 63.

The fact being certain, that ants impart their ideas to each other, we are next led to inquire by what means this is accomplished. It does not appear that, like the bees, they emit any significant sounds; their language, therefore, must consist of signs or gestures, some of which I shall now detail. In communicating their fear, or expressing their anger, they run from one to another in a semicircle, and strike with their head or jaws the trunk or abdomen of the ant to which they mean to give information on any subject of alarm. But those remarkable organs, their antennæ, are the principal instruments of their speech, if I may so call it, supplying the place both of voice and words. When the military ants before alluded to go upon their expeditions, and are out of the formicary, previously to setting off, they touch each other on the trunk with their antennæ and forehead; this is the signal for marching, for, as soon as any one has received it, he is immediately in motion. When they have any discovery to communicate, they strike with them those that they meet in a particularly impressive manner. If a hungry ant wants to be fed, it touches with its two antennæ, moving them very rapidly, those of the individual from which it expects its meal:—and not only ants understand this language, but even aphides and cocci, which are the milch kine of our little pismires, do the same, and will yield them their saccharine fluid at the touch of these imperative organs. The helpless larvæ also of the ants are informed, by the same means, when they may open their mouths to receive their food.

Next to their language, and scarcely different from it, are the modes by which they express their affections and aversions. Whether ants, with man and some of the larger animals, experience any thing like attachment to individuals, is not easily ascertained; but that they feel the full force of the sentiment which we term patriotism, or the love of the community to which they belong, is evident from the whole series

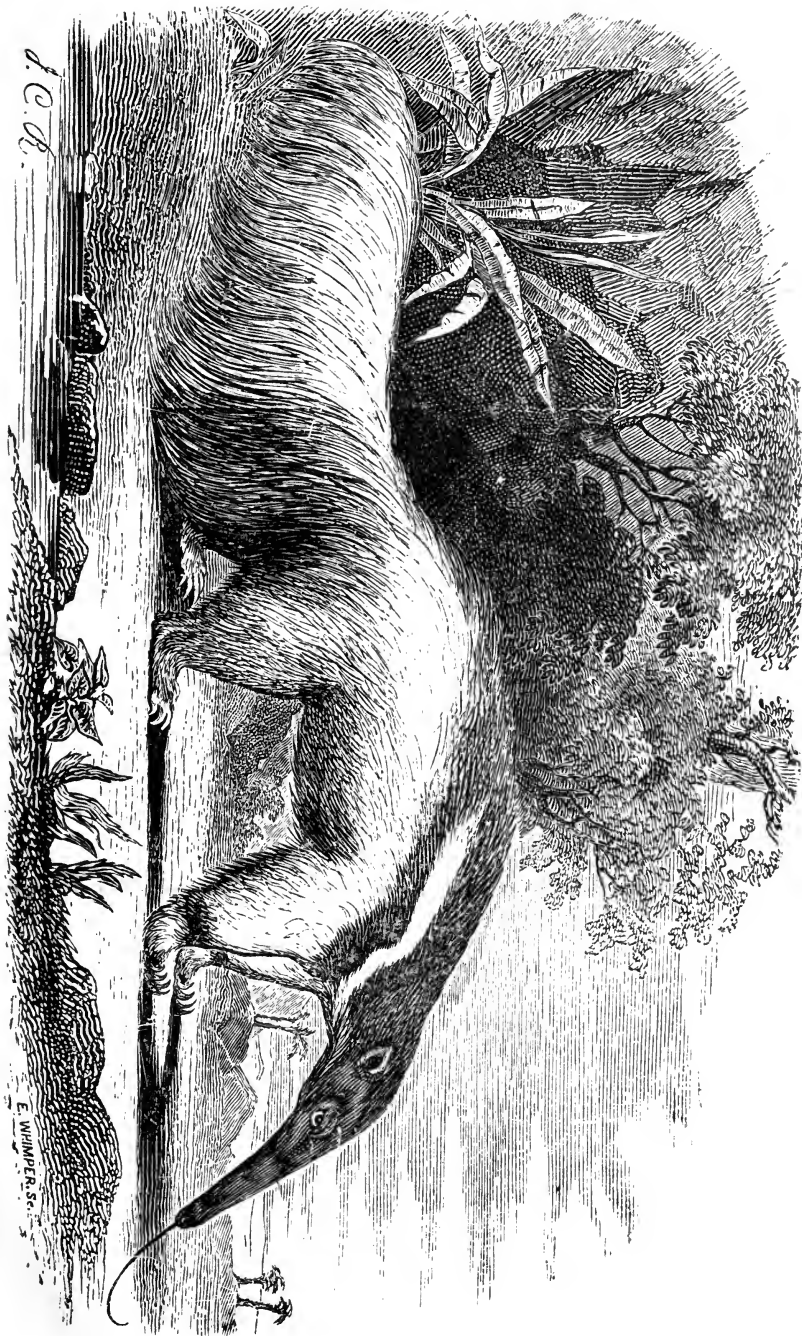
of their proceedings, which all tend to promote the general good. Distress or difficulty falling upon any member of their society, generally excites their sympathy, and they do their utmost to relieve it. M. Latreille once cut off the antennæ of an ant; and its companions, evidently pitying its sufferings, anointed the wounded part with a drop of transparent fluid from their mouth: and whoever attends to what is going forward in the neighbourhood of one of their nests, will be pleased to observe the readiness with which they seem disposed to assist each other in difficulties. When a burden is too heavy for one, another will soon come to ease it of part of the weight; and if one is threatened with an attack, all hasten to the spot, to join in repelling it.

The satisfaction they express at meeting after absence is very striking, and gives some degree of individuality to their attachment. M. Huber witnessed the gesticulations of some ants, originally belonging to the same nest, that, having been entirely separated from each other four months, were afterwards brought together. Though this was equal to one-fourth of their existence as perfect insects, they immediately recognized each other, saluted mutually with their antennæ, and united once more to form one family.

They are also ever intent to promote each other's welfare, and ready to share with their absent companions any good thing that they may meet with. Those that go abroad feed those which remain in the nest, and if they discover any stock of favourite food, they inform the whole community, as we have seen above, and teach them the way to it. M. Huber, for a particular reason, having produced heat, by means of a flambeau, in a certain part of an artificial formicary, the ants that happened to be in that quarter, after enjoying it for a time, hastened to convey the welcome intelligence to their compatriots, whom they even carried suspended upon their jaws (their usual mode of transporting each other) to the spot, till hundreds might be seen thus laden with their friends.

If ants feel the force of love, they are equally susceptible of the emotions of anger; and when they are menaced or attacked, no insects shew a greater degree of it. Providence, moreover, has furnished them with weapons and faculties which render them extremely formidable to their insect enemies, and sometimes, as I have related on a former occasion, a great annoyance to man himself, (vol. i. 2d ed. p. 123.) Two strong mandibles arm their mouth, with which they sometimes fix themselves so obstinately to the object of their attack, that they will sooner be torn limb from limb than let go their hold; and, after their battles, the head of a conquered enemy may often be seen suspended to the antennæ or legs of the victor, a trophy of his valour, which, however troublesome,

THE ANT EATER.





INGENUITY OF THE SPIDER. .

he will be compelled to carry about with him to the day of his death. Their abdomen is also furnished with a poison-bag, (*ioterium*,) in which is secreted a powerful and venomous fluid, long celebrated in chemical researches, and once called *formic acid*, though now considered a modification of the *acetic* and *malic*;* which, when their enemy is beyond the reach of their mandibles, (it is spoken here particularly of the hill ant, or *F. rufa*,) standing erect on their hind legs, they discharge from their anus with considerable force, so that from the surface of the nest ascends a shower of poison, exhaling a strong sulphurous odour, sufficient to overpower or repel any insect or small animal. Such is the fury of some species, that with the acid, according to Gould, p. 34. they sometimes partly eject the poison-bag itself. If a stick be stuck into one of the nests of the hill ant, it is so saturated with the acid as to retain the scent for many hours. A more formidable weapon arms the species of the genus *Myrmica latr.*; for, besides the poison-bag, they are furnished with a sting; and their aspect is also often rendered peculiarly revolting, by the extraordinary length of their jaws, and by the spines which defend their head and trunk.

But weapons without valour are of but little use; and this is one distinguishing feature of this pigmy race. Their courage and pertinacity are unconquerable, and are often sublimed into the most inconceivable rage and fury. It makes no difference to them whether they attack a mite or an elephant; and man himself instils no terror into their warlike breasts. Point your finger towards any individual of *F. rufa*; instead of running away, it instantly faces about, and, that it may make the most of itself, stiffening its legs into a nearly straight line, it gives its body the utmost elevation it is capable of; and thus—

“Collecting all its might, dilated stands,”

prepared to repel your attack. Put your finger a little nearer, it immediately opens its jaws to bite you, and rearing upon its hind legs, bends its abdomen between them, to eject its venom into the wound.†

This angry people, so well armed and so courageous, we may readily imagine, are not always at peace with their neighbours; causes of dissension may arise, to light the flame of war between the inhabitants of nests not far distant from each other. To these little bustling creatures, a square foot of earth is a territory worth contending for; their droves of aphides being equally valuable with the flocks and herds that cover

* See Fourcroy, *Annales du Muséum*, No. 5, p. 338, 342. Some, however, still regard it as a distinct acid.

† See Fourcroy, *Annales du Muséum*, No. 5. p. 343.

our pl; ins; and the body of a fly or a beetle, or a cargo of straws and bits of stick, an acquisition as important as the treasures of a Lima fleet to our seamen. Their wars are usually between nests of different species; sometimes, however, those of the same, when so near as to interfere with and incommode each other, have their battles; and with respect to ants of one species, *Myrmica rubra*, combats occasionally take place, contrary to the general habits of the tribe of ants, between those of the same nest.

The wars of the red ant (*M. rubra*) are usually between a small number of the citizens; and the object, according to Gould, is to get rid of a useless member of the community, (it does not argue much in favour of their humanity, that it is all one if it be by sickness that this member is disabled,) rather than any real civil contest. The red colonies, (says this author,) are the only ones I could ever observe to feed upon their own species. You may frequently discern a party of from five or six to twenty, surrounding one of their own kind, or even fraternity, and pulling it to pieces. The ant they attack is generally feeble, and of a languid complexion, occasioned perhaps by some accident or other.—*Gould*, 104.

"I once saw one of these ants dragged out of the nest by another, without its head; it was still alive, and could crawl about. A lively imagination might have fancied that this poor ant was a criminal, condemned by a court of justice to suffer the extreme sentence of the law. It was more probably, however, a champion that had been decapitated in an unequal combat, unless we admit Gould's idea, and suppose it to have suffered because it was an unprofitable member of the community.* At another time I found three individuals that were fighting with great fury, chained together by their mandibles; one of these had lost two of the legs of one side, yet it appeared to walk well, and was as eager to attack and seize its opponents, as if it was unhurt. This did not look like languor or sickness."

The wars of ants that are not of the same species take place usually between those that differ in size; and the great endeavouring to oppress the small, are nevertheless often outnumbered by them, and defeated. Their battles have long been celebrated; and the dates of them, as if they were events of the first importance, have been formally recorded. *Æneas Sylvius*, after giving a very circumstantial account of one con-

* One would think the writer of the account of ants, in *Mouffet*, had been witness to something similar. "If they see any one idle," (says he,) "they not only drive him as spurious, without food, from the nest; but likewise, a circle of all ranks being assembled, cut off his head before the gates, that he may be a warning to their children, not to give themselves up for the future to idleness and effeminacy."—*Theatr. Ins.* p. 241.

tested with much obstinacy by a great and small species, on the trunk of a pear-tree, gravely states, "This action was fought in the pontificate of Eugenius the Fourth, in the presence of Nicholas Pistoriensis, an eminent lawyer, who related the whole history of the battle with the greatest fidelity!" A similar engagement between great and small ants is recorded by Olaus Magnus, in which the small ones being victorious, are said to have buried the bodies of their own soldiers, but left those of their giant enemies a prey to the birds. This event happened previous to the expulsion of the tyrant Christian the Second from Sweden.—*Mouffet, Theatr. Ins* 242.

M. P. Huber is the only modern author that appears to have been witness to these combats. He tells us, that when the great attack the small, they seek to take them by surprise, (probably to avoid their fastening themselves to their legs,) and, seizing them by the upper part of the body, they strangle them with their mandibles; but when the small have time to foresee the attack, they give notice to their companions, who rush in crowds to their succour. Sometimes, however, after suffering a signal defeat, the smaller species are obliged to shift their quarters, and to seek an establishment more out of the way of danger. In order to cover their march, many small bodies are then posted at a little distance from the nest. As soon as the large ants approach the camp, the foremost sentinels instantly fly at them with the greatest rage; a violent struggle ensues, multitudes of their friends come to their assistance, and, though no match for their enemies singly, by dint of numbers they prevail, and the giant is either slain or led captive to the hostile camp. The species whose proceedings M. Huber observed, were *F. herculanea*, *L.* and *F. sanguinea*, *Latr.*; neither of which have yet been discovered in Britain.—*Huber*, 160.

THE WHITE ANTS, OR TERMITES.—The majority of these animals are natives of tropical countries, though two species are indigenous to Europe; one of which, thought to have been imported, is come so near to us as Bourdeaux. Their society consists of five different descriptions of individuals: workers or larvæ, nymphs or pupæ, neuters or soldiers males, and females.

1. The workers or larvæ, answering to the hymenopterous neuters, are the most numerous, and, at the same time, most active part of the community; upon whom devolves the office of erecting and repairing the buildings, collecting provision, attending upon the female, conveying the eggs, when laid, to the nurseries, and feeding the young larvæ till they are old enough to take care of themselves. They are distinguished

from the soldiers by their diminutive size, by their round heads, and shorter mandibles.

2. The nymphs, or pupæ, differ in nothing from the larvæ, and probably are equally active, except that they have rudiments of wings, or rather wings folded up in cases.

3. The neuters are much less numerous than the workers, bearing the proportion of one to one hundred, and exceeding them greatly in bulk. They are also distinguishable by their long and large heads, armed with very long tubulate mandibles. Their office is that of sentinels; and when the nest is attacked, to them is committed the task of defending it. These neuters seem to be a kind of abortive females, and there is nothing analogous to them in any other department of entomology.

4 and 5. Males and females, or the insects arrived at a state of perfection, and capable of continuing the species. There is only one of each in every separate society; they are exempted from all participation in the labours and employments occupying the rest of the community, that they may be wholly devoted to the furnishing of a constant accession to the population of the colony. Though at their first disclosure from the pupæ they have four wings, like the female ants, they soon cast them; but they may then be distinguished from the blind larvæ, pupæ, and neuters, by their large and prominent eyes.

The different species of Termites, which are numerous, build nests of very various forms. Some construct upon the ground a cylindrical turret of clay, about three-quarters of a yard high, surrounded by a projecting conical roof, so as in shape considerably to resemble a mushroom, and composed interiorly of innumerable cells, of various figures and dimensions. Others prefer a more elevated site, and build their nests, which are of different sizes, from that of a hat to that of a sugar-cask, and composed of pieces of wood glued together, amongst the branches of trees, often seventy or eighty feet high. But by far the most curious habitations, are those formed by the *Termes bellicosus*, a species very common in Guinea, and other parts of the coasts of Africa, of whose proceedings we have a very particular and interesting account in the 71st volume of the Philosophical Transactions.

These nests are formed entirely of clay, and are generally twelve feet high, and broad in proportion; so that when a cluster of them, as is often the case in South America, are placed together, they may be taken for an Indian village, and are in fact sometimes larger than the huts which the natives inhabit. The first process in the erection of these singular structures, is the elevation of two or three turrets of clay, about a foot high, and in shape like a sugar-loaf. These, which seem to be the scaffolds of the future building, rapidly increase in number

and height, until at length being widened at the base, joined at the top into one dome, and consolidated all around into a thick wall of clay, they form a building of the size above-mentioned, and of the shape of a haycock, which, when clothed, as it generally soon becomes, with a coating of grass, it at a distance very much resembles. When the building has assumed this its final form, the inner turrets, all but the tops, which project like pinnacles from different parts of it, are removed, and the clay employed over again in other services. It is the lower part alone of the building that is occupied by the inhabitants; the upper portion, or dome, which is very strong and solid, is left empty, serving principally as a defence from the vicissitudes of the weather and the attacks of natural or accidental enemies, and to keep up in the lower part a genial warmth and moisture, necessary to the hatching of the eggs and cherishing of the young ones. The inhabited portion is occupied by the royal chamber, or habitation of the king and queen; the nurseries for the young; the storehouses for food; and innumerable galleries, passages, and empty rooms, arranged according to the following plan:—

In the centre of the building, just under the apex, and nearly on a level with the surface of the ground, is placed the royal chamber, an arched vault of a semi-oval shape, or not unlike a long oven; at first not above an inch long, but enlarged, as the queen increases in bulk, to the length of eight inches or more. In this apartment the king and queen constantly reside, and, from the smallness of the entrances, which are barely large enough to admit their more diminutive subjects, can never possibly come out; thus, like many human potentates, purchasing their sovereignty at the dear rate of the sacrifice of liberty. Immediately adjoining the royal chamber, and surrounding it on all sides to the extent of a foot or more, are placed the royal apartments, an inextricable labyrinth of innumerable arched rooms, of different shapes and sizes, either opening into each other, or communicating by common passages, and intended for the accommodation of the soldiers and attendants, of whom many thousands are always in waiting on their royal master and mistress.

Next to the royal apartments come the nurseries and the magazines. The former are invariably occupied by the eggs and young ones, and, in the infant state of the nest, are placed close to the royal chamber; but when the queen's augmented size requires a larger apartment, as well as additional rooms for the increased number of attendants wanted to remove her eggs, the small nurseries are taken to pieces, rebuilt at a greater distance, a size larger, and their number increased at the same time. In substance they differ from all the other apartments, being formed of particles of wood, apparently

joined together with gums. A collection of these compact, irregular, and small wooden chambers, not one of which is half an inch in width, is inclosed in a common chamber of clay, sometimes as big as a child's head. Intermixed with the nurseries, lie the magazines, which are chambers of clay, always well stored with provisions, consisting of particles of wood, gums, and the inspissated juices of plants.

These magazines and nurseries, separated by small empty chambers and galleries, which run round them, or communicate from one to the other, are continued on all sides to the outer wall of the building, and reach up within it two-thirds or three-fourths of its height. They do not, however, fill up the whole of the lower part of the hill, but are confined to the sides, leaving an open area in the middle, under the dome, very much resembling the nave of an old cathedral, having its roof supported by two very large Gothic arches, of which those in the middle of the area are sometimes two and three feet high, but as they recede on each side, rapidly diminish, like the arches of aisles in perspective. A flattish roof, imperforated, in order to keep out the wet, if the dome should chance to be injured, covers the top of the assemblage of chambers, nurseries, &c.; and the area, which is a short height above the royal chamber, has a flattish floor, also waterproof, and so contrived as to let any rain, that may chance to get in, run off into the subterraneous passages.

These passages or galleries, which are of an astonishing size, some being above a foot in diameter, perfectly cylindrical, and lined with the same kind of clay of which the hill is composed, served originally, like the catacombs of Paris, as the quarries whence the materials of the building were derived, and afterwards as the grand outlets by which the termites carry on their depredations at a distance from their habitations. They run in a sloping direction, under the bottom of the hill, to the depth of three or four feet, and then branching out horizontally on every side, are carried under ground, near to the surface, to a vast distance. At their entrance into the interior, they communicate with other small galleries, which ascend the outside of the outer shell in a spiral manner, and, winding round the whole body to the top, intersect each other at different heights, opening either immediately in the dome in various places, and into the lower half of the building, or communicating with every part of it by other smaller circular or oval galleries of different diameters. The necessity for the vast size of the main underground galleries, evidently arises from the circumstance of their being the great thoroughfares for the inhabitants, by which they fetch their clay, wood, water, or provision; and their spiral and gradual ascent is requisite for the easy access of the termites, which cannot,

but with great difficulty, ascend a perpendicular. To avoid this inconvenience, in the interior vertical parts of the building, a flat pathway, half an inch wide, is often made to wind gradually, like a road cut out of the side of a mountain; by which they travel with great facility up ascents otherwise impracticable. The same ingenious propensity to shorten their labour, seems to have given birth to a contrivance still more extraordinary: this is a kind of bridge, or vast arch, sprung from the floor of the area to the upper apartments at the side of the building, which answers the purpose of a flight of stairs, and must shorten the distance exceedingly in transporting eggs from the royal chambers to the upper nurseries, which in some hills would be four or five feet in the straightest line, and much more if carried through all the winding passages which lead through the inner chambers and apartments. Mr. Smeathman measured one of these bridges, which was half an inch broad, a quarter of an inch thick, and ten inches long, making the size of an elliptic arch of proportionable dimensions, so that it is wonderful it did not fall over, or break by its own weight, before they got it joined to the side of the column above. It was strengthened by a small arch at the bottom, and had a hollow or groove all the length of the upper surface, either made purposely for the greater safety of the passengers, or else worn by frequent treading. It is not the least surprising circumstance attending this bridge, the Gothic arches before spoken of, and in general all the arches of the various galleries and apartments, that, as Mr. Smeathman saw every reason for believing, the termites project them, and do not, as one would have supposed, excavate them.

Consider what incredible labour and diligence, accompanied by the most unremitting activity, and the most unwearied celerity of movement, must be necessary to enable these creatures to accomplish (their size considered) these truly gigantic works. That such diminutive insects, for they are scarcely the fourth of an inch in length, however numerous, should, in the space of three or four years, be able to erect a building twelve feet high, and of proportionable bulk, covered by a vast dome, adorned without by numerous pinnacles and turrets, and sheltering under its ample arch myriads of vaulted apartments, of various dimensions, and constructed of different materials,—that they should moreover excavate, in different directions and at different depths, innumerable subterranean roads or tunnels; some twelve or thirteen inches in diameter, or throw an arch of stone over other roads leading from the metropolis into the adjoining country, to the distance of seven hundred feet,—that they should project and finish the vast interior staircases or bridges, lately described,—and finally, that the millions necessary to execute such Herculean labours,

perpetually passing to and fro, should never interrupt and interfere with each other, is a miracle of nature, far exceeding the most boasted works and structures of man; for, did these creatures equal him in size, retaining their usual instincts and activity, their buildings would soar to the astonishing height of half a mile, and their tunnels would expand to a magnificent cylinder of more than three hundred feet in diameter; before which, the pyramids of Egypt, and the aqueducts of Rome, would lose their celebrity, and dwindle into nothing.

The most elevated of the pyramids of Egypt is not more than six hundred feet high, which, setting the average height of man at only five feet, is not more than a hundred and twenty times the height of the workmen employed. Whereas, the nests of the termites being at least twelve feet high, and the insects themselves not exceeding a quarter of an inch in stature, their edifices are upwards of five hundred times the height of the builders; which, supposing them of human dimensions, would be more than half a mile. The shaft of the Roman aqueducts was lofty enough to permit a man on horseback to travel in them.

The first establishment of a colony of termites takes place in the following manner. In the evening, soon after the first tornado, which at the latter end of the dry season proclaims the approach of the ensuing rains, these animals, having attained to their perfect state, in which they are furnished and adorned with two pair of wings, emerge from their clay-built citadels by myriads and myriads, to seek their fortune. Borne on these ample wings, and carried by the wind, they fill the air, entering the houses, extinguishing the lights, and are sometimes driven on board the ships that are not far from the shore. The next morning, they are discovered covering the earth and waters, deprived of the wings which enabled them to avoid their numerous enemies, and which were only calculated to carry them a few hours. They now look like large maggots; and, from the most active, industrious, and rapacious creatures, they are become the most helpless and cowardly beings in nature, the prey of innumerable enemies, to the smallest of which they make not the least resistance. Insects, especially ants, which are always on the hunt for them, leave no place unexplored: birds, reptiles, beasts, and even man himself, look upon this event as their harvest, and, as the reader has been told before, make them their food, so that scarcely a pair in many millions get into a place of safety.

The workers, who are continually prowling about in their covered ways, occasionally meet with one of these pairs, and being impelled by their instinct, pay them homage, and they are elected as it were to be king and queen, or rather founders,

of a new colony: all that are not so fortunate, inevitably perish; and, considering the infinite host of their enemies, probably in the course of the following day. The workers, as soon as this election takes place, begin to inclose their new rulers in a small chamber of clay, before described, suited to their size, the entrances to which are only large enough to admit themselves and the neuters, but much too small for the royal pair to pass through;—so that their state of royalty is a state of confinement, and so continues during the remainder of their existence. The female, after this confinement, soon begins to furnish the infant colony with new inhabitants. The care of feeding her and her companion, devolves upon the industrious larvæ, which supply them both with every thing that they want. As she increases in dimensions, they continue to enlarge the cell in which she is detained. When the business of oviposition commences, they take the eggs from her, and deposit them in their nurseries. Her abdomen now begins gradually to extend, till in process of time it is enlarged to fifteen hundred or two thousand times the size of the rest of her body, and her bulk equals that of twenty or thirty thousand workers. This part, often more than three inches in length, is now a vast matrix of eggs, which make long circumvolutions through numberless slender serpentine vessels. It is also remarkable for its peristaltic motion, (in this resembling the female ant; see *Gould's Account of English Ants*, p. 22.) which, like the undulations of water, produces a perpetual and successive rise and fall over the whole surface of the abdomen, and occasions a constant extrusion of the eggs, amounting sometimes in old females to sixty in a minute, or eighty thousand and upwards in twenty-four hours. As these females live two years in their perfect state, how astonishing must be the number produced in that time!

This incessant extrusion of eggs must call for the attention of a large number of the workers in the royal chamber, (and indeed it is always full of them,) to take them as they come forth, and carry them to the nurseries, in which, when hatched, they are provided with food, and receive every necessary attention, till they are able to shift for themselves. One remarkable circumstance attends these nurseries; they are always covered with a kind of mould, amongst which arise numerous globules, about the size of a pin's head. This is probably a species of *mucor*; and by Mr. Kœnig, who found them also in nests of an East Indian species of *termes*, is conjectured to be the food of the larvæ.

The royal cell has also some soldiers in it, a kind of body-guard to the royal pair that inhabit it; and the surrounding apartments contain always many, both labourers and soldiers, in waiting, that they may successively attend upon and defend

the common father and mother, on whose safety depend the happiness and even existence of the whole community; and whom these faithful subjects never abandon even in the last distress.

These little busy creatures are taught by Providence always to work under cover. If they have to travel over a rock, or up a tree, they vault, with a coping of earth, the route they mean to pursue, and they form subterranean paths and tunnels, some of a diameter wider than the bore of a large cannon, on all sides from their habitation, to their various objects of attack, or which sloping down, (for they cannot well mount a surface quite perpendicular,) penetrate to the depth of three or four feet under their nests into the earth, till they arrive at a soil proper to be used in the erection of their buildings. Were they, indeed, to expose themselves, the race would soon be annihilated by their innumerable enemies. If any accident happen to their various structures, or if they are dislodged from any of their covered ways, they are active and expeditious in repairing it; and in a single night they will restore a gallery of three or four yards in length. If, attacking the nest, you divide it into halves, leaving the royal chamber, and thus lay open thousands of apartments, all will be shut up with their sheets of clay by the next morning; nay, even if the whole be demolished, provided the king and the queen be left, every interstice between the ruins, at which either cold or wet can possibly enter, will be covered, and, in a year, the building will be raised nearly to its pristine size and grandeur.

Besides building and repairing, a great deal of their time is occupied in making necessary alterations in their mansion and its approaches. The royal presence chamber, as the female increases in size, must be gradually enlarged; the nurseries must be removed to a greater distance; the chambers and interior of the nest receive daily accessions, to provide for a daily increasing population; and the direction of their covered ways must often be varied, when the old stock of provision is exhausted, and new sources are discovered.

The collection of provisions for the use of the colony is another employment, which necessarily calls for incessant attention: these, to the naked eye, appear like raspings of wood; but when examined by the microscope, they are found to consist chiefly of gums and the inspissated juices of plants, which, formed into little masses, are stored up in magazines made of clay.

When any one is bold enough to attack their nest, and make a breach in its walls, the labourers, who are incapable of fighting, retire within, and give way to another description of its inhabitants, whose office it is to defend the fortress when

assailed by enemies ; these, as observed before, are the *leuteurs* or soldiers. If the breach be made in a slight part of the building, one of these comes out to reconnoitre ; he then retires and gives the alarm. Two or three others next appear, scrambling as fast as they can one after the other ; to these succeed a large body, who rush forth with as much speed as the breach will permit, their numbers continually increasing during the attack. It is not easy to describe the rage and fury by which these diminutive heroes seem actuated. In their haste they frequently miss their hold, and tumble down the sides of their hill : they soon, however, recover themselves, and, being blind, bite every thing they run against. If the attack proceeds, the bustle and agitation increase to a tenfold degree, and their fury is raised to its highest pitch. Wo to him whose hands or legs they can come at ! for they will make their fanged jaws meet at the very first stroke, drawing as much blood as will counterpoise their whole body, and never quitting their hold, even though they are pulled limb from limb. The naked legs of the negroes expose them frequently to this injury ; and the stockings of the Europeans are not thick enough to defend them.

On the other hand, if, after the first attack, you get a little out of the way, giving them no further interruption, supposing the assailant of their citadel is gone beyond their reach, in less than half an hour they will retire into the nest ; and before they have all entered, you will see the labourers in motion, hastening in various directions towards the breach, every one carrying in his mouth a mass of mortar, half as big as his body, ready tempered ; this mortar is made of the finest parts of the gravel, which they probably select in the subterranean pits or passages before described, which, worked up to a proper consistence, hardens to the solid substance resembling stone, of which their nests are constructed : they never appear to embarrass or interrupt one another. By the united labours of such an infinite host of creatures, the wall soon rises, and the breach is repaired.

While the labourers are thus employed, almost all the soldiers have retired quite out of sight, except here and there one, who saunters about amongst the labourers, but never assists in the work. One in particular places himself close to the wall which they are building ; and turning himself leisurely on all sides, as if to survey the proceedings, appears to act the part of an overseer of the works. Every now and then, at the interval of a minute or two, by lifting up his head and striking his forceps upon the wall of the nest, he makes a particular noise, which is answered by a loud hiss from all the labourers, and appears to be a signal for dispatch ; for, every time it is heard, they may be seen to redouble their pace, and

apply to their work with increased diligence. Renew the attack, and this amusing scene will be repeated : in rush the labourers, all disappearing in a few seconds, and out march the military, as numerous and vindictive as before. When all is once more quiet, the busy labourers re-appear, and resume their work, and the soldiers vanish. Repeat the experiment a hundred times, and the same will always be the result ; you will never find, be the peril or emergency ever so great, that one order attempts to fight, or the other to work.

We have seen how solicitous the termites are to move and work under cover, and concealed from observation : this, however, is not always the case ; there is a species larger than *T. bellicosus*, whose proceedings we have been principally describing, which Mr. Smeathman calls the marching Termes (*Termes viarum*). He was once passing through a thick forest, when on a sudden, a loud hiss, like that of serpents, struck him with alarm. The next step produced a repetition of the sound, which he then recognized to be that of white ants ; yet he was surprised at seeing none of their hills or covering ways. Following the noise, to his great astonishment and delight, he saw an army of these creatures emerging from a hole in the ground ; their number was prodigious, and they marched with the utmost celerity. When they had proceeded about a yard, they divided into two columns, chiefly composed of labourers, about fifteen abreast, and following each other in close order, and going straight forward. Here and there was seen a soldier, carrying his vast head with apparent difficulty, and looking like an ox in a flock of sheep, who marched on in the same manner. At the distance of a foot or two from the columns, many other soldiers were to be seen, standing still or pacing about as if upon the look-out, lest some enemy should suddenly surprise their unwarlike comrades ; other soldiers, (which was the most extraordinary and amusing part of the scene,) having mounted some plants, and placed themselves on the points of their leaves, elevated from ten to fifteen inches from the ground, hung over the army marching below, and by striking their forceps upon the leaf, produced at intervals the noise above-mentioned. To this signal the whole army returned a hiss, and obeyed it by increasing their pace. The soldiers at these signal-stations sat quite still during the interval of silence, except now and then making a slight turn of the head, and seemed as solicitous to keep their posts as regular sentinels. The two columns of this army united, after continuing separate from twelve to fifteen paces, having in no part been above three yards asunder, and then descended into the earth by two or three holes. Mr. Smeathman continued watching them for above an hour, during which time their numbers appeared neither to increase nor diminish: the sol-

diers, however, who quitted the line of march and acted as sentinels, became much more numerous before he quitted the spot. The larvæ and neuters of this species are furnished with eyes.

The societies of *Termes lucifergus*, discovered by Latreille, at Bourdeaux, are very numerous; but instead of erecting artificial nests, they make their lodgment in the trunks of pines and oaks, where the branches diverge from the tree. They eat the wood nearest the bark, or the alburnum, without attacking the interior, and bore a vast number of holes and irregular galleries. That part of the wood appears moist, and is covered with little gelatinous particles, not unlike gum-arabic. These insects seem to be furnished with an acid of a very penetrating odour, which, perhaps, is useful to them for penetrating the wood. The soldiers in these societies are as about one to twenty-five of the labourers.

The anonymous author of the observations on the termites of Ceylon, seems to have discovered a sentry-box in his nests. "I found," says he, "in a very small cell in the middle of the solid mass, (a cell about half an inch in height, and very narrow,) a larva with an enormous head. Two of these individuals were in the same cell; one of the two seemed placed as sentinel at the entrance of the cell. I amused myself by forcing the door two or three times; the sentinel immediately appeared, and only retreated when the door was on the point of being stopped up, which was done by the labourers."

THE GREEN ANTS.—Captain Cook gives the following account of a very peculiar kind of ants, which he met with at Botany Bay.—"They are as green as a leaf. They live upon trees, where they build their nests. The nests are of a very curious structure: they are formed by bending down several of the leaves, each of which is as broad as a man's hand; they glue the points of them together, so as to form a purse. The viscus used for this purpose is an animal juice, which nature has enabled them to elaborate. Their method of first bending down the leaves, our naturalists had not an opportunity of observing; but they saw thousands uniting all their strength to hold them in this position, while other busy multitudes were employed within, in applying the gluten that was to prevent their returning back. To satisfy themselves that the leaves were bent and held down by the efforts of these diminutive artificers, our people disturbed them in their work, and, as soon as they were driven from their station, the leaves on which they were employed sprang up with a force much greater than they could have thought them able to conquer, by any combination of their strength."

THE VISITING ANTS.—At Paramaribo, a Dutch colony in the province of Surinam, there is a species of ants, which the Portuguese call visiting ants: they march in troops, and as soon as they appear, all the coffers and chests of drawers are laid open, which they clear of rats, mice, and a peculiar sort of insect in that country, called *cackerlacks*, and of other noxious animals. If any one chance to molest them, they fall upon him, and tear in pieces his stockings and shoes. Their visits are rare; and sometimes they do not appear for three years.—*Templeman's Obs.* vol. i. p. 36.

We conclude this chapter with an account of **THE ANT-LION.**—There is no insect more remarkable for its dexterity than the ant-lion, though its figure announces nothing extraordinary. It nearly resembles the woodlouse; its body being provided with six feet, composed of several membranous rings, and terminated in a point. Its head, flat and square, is armed with two moveable crooked horns, whose singular structure shews how admirable Nature is, even in the least of her works.

This insect is the most subtle and dangerous enemy the ant has; the plans which he forms to ensnare his prey, are very ingenious. He mines a portion of land in the form of a funnel, at the bottom of which he waits to seize the ants, which coming by chance to the edge of the precipice, are thence hurried down to their merciless foe. In order to dig it, he first traces in the sand a circular furrow, whose circumference forms precisely the mouth of the funnel, the diameter of which is always equal to the depth he gives to his ditch. When he has determined the space of this opening, and traced the first furrow, he immediately digs a second, concentric to the other, in order to throw out all the sand contained in the first circle. He makes all these operations with his head, which serves him instead of a shovel, and its flat and square form admirably adapts it to this purpose. He also takes some sand with one of his fore feet, to throw it beyond the first furrow; and this work is repeated till the insect has reached a certain depth of sand. Sometimes, in digging, he meets with grains of sand larger than usual, or with little bits of dry earth, which he will not suffer to remain in his tunnel; of these he disencumbers himself by a sudden and well-timed manœuvre of his head. Should he find particles yet larger, he endeavours to push them away with his back, and he is so assiduous in this labour, that he repeats it six or seven times.

At length the ant-lion comes to collect the fruits of his toil. His nets being once well laid, he has nothing to do but to put himself on the watch; accordingly, immovable and concealed at the bottom of the ditch which he has dug, he

patiently waits for the prey which he cannot pursue. If some unhappy ant is inadvertently drawn to the borders of this fatal precipice, she is almost sure to roll down to the bottom, because the brink is made sloping, and thus the sand giving way beneath her feet, she is forced to follow the dangerous declivity till she falls into the power of her destroyer, who, by means of his horns, draws her under the sand, and feasts upon her blood. When he has sucked all the juices from her body, he contrives to eject from his habitation the dry and hollow carcase, repairs any damage his trench may have sustained, and puts himself again in ambush. He does not always succeed in seizing his prey at the moment of its fall; it frequently escapes him, and endeavours to remount the funnel; but then the ant-lion works with his head, and causes a shower of sand to descend upon his captive, and precipitate it once more to the bottom.

All the actions of this little animal display an art so extraordinary, that we might often examine them without being wearied. The ant-lion employs itself in preparing trenches even before having seen the animal which they are to ensnare, and which is to serve it for nourishment; and yet its actions are regulated in a manner the best adapted to accomplish these purposes.

How would an animal, so destitute of agility, have been able to entrap its prey more easily than by digging in a moveable sand, and giving a sloping declivity to this funnel? What better stratagem could it have devised for recovering the ants which were on the point of escaping even from this skilfully constructed snare, than in overwhelming them with showers of sand, and thus cutting off all hopes of a retreat? All its actions have fixed principles by which they are directed. The trench must be dug in the sand, or it could not answer the desired purpose; and it must, according to the structure of its body, work backwards, using its horns like a pair of pincers, in order to throw the sand over the brink of the funnel. The instinct which governs this insect, discovers to us a First Cause, whose intelligence has foreseen and ordained every thing that was necessary for the preservation and well-being of such an animal.

CHAP. XXVI.

CURIOSITIES RESPECTING INSECTS.—(Continued.)

The Spider—Ingenuity of the Spider—Spider tamed—Curious Anecdote of a Spider, &c.

THE SPIDER.

The spider's touch, how exquisitely fine!
Feels at each thread, and lives along the line.

Pope.

ONE of the largest of the European spiders is the *Aranea diadema* of Linnæus, which is extremely common in our own country, and is chiefly seen during the autumnal season, in gardens, &c. The body of this species, when full grown, is not much inferior in size to a small hazel-nut: the abdomen is beautifully marked by a longitudinal series of round or drop-shaped milk-white spots, crossed by others of similar appearance, so as to represent, in some degree, the pattern of a small diadem. This spider, in the months of September and October, forms, in some convenient spot or shelter, a large round close or thick web of yellow silk, in which it deposits its eggs, guarding the round web with a secondary one of a looser texture. The young are hatched in the ensuing May, the parent insects dying towards the close of autumn. The *aranea diadema* being one of the largest of the common spiders, serves to exemplify some of the principal characters of the genus in a clearer manner than most others. At the tip of the abdomen are placed five papillæ, or teats, through which the insect draws its thread; and as each of these papillæ is furnished with a vast number of foramina or outlets, disposed over its whole surface, it follows, that what we commonly term a spider's thread, is in reality formed of a collection of a great many distinct ones; the animal possessing the power of drawing out more or fewer at pleasure; and if it should draw from all the foramina at once, the thread might consist of many hundred distinct filaments. The eyes, which are situated on the upper part or front of the thorax, are eight in number, placed at a small distance from each other, and have the appearance of the stemmata in the generality of insects. The fangs, or piercers, with which the animal wounds its prey, are strong, curved, sharp-pointed, and each furnished on the inside, near the tip, with a small oblong hole or slit, through which is injected a poisonous fluid into the wound made by the point itself, these organs operating in miniature on the same principle with the fangs in poisonous serpents.

The feet are highly curious, the two claws, with which each is terminated, being furnished on its under side with several parallel processes, resembling the teeth of a comb, and enabling the animal to dispose and manage, with the utmost facility, the disposition of the threads in its web, &c.

The *Aranea tarantula*, or Tarantula spider, of which so many idle recitals have been detailed in the works of the learned, and which, even to this day, continues in some countries to exercise the faith and ignorance of the vulgar, is a native of the warmer parts of Italy, and other warm European regions, and is generally found in dry and sunny plains. It is the largest of all the European spiders; but the extraordinary symptoms supposed to ensue from the bite of this insect, as well as their supposed cure by the power of music alone, are entirely fabulous, and are now sufficiently exploded among all rational philosophers. The gigantic *Aranea avicularia*, or Bird-catching spider, is not uncommon in many parts of the East Indies and South America, where it resides among trees, frequently seizing on small birds, which it destroys by wounding with its fangs, and sucking their blood.

During the early part of the last century, a project was entertained by a French gentleman, Monsieur Bon, of Montpellier, of instituting a manufacture of spiders' silk; and the Royal Academy, to which the scheme was proposed, appointed the ingenious Reaumur to repeat the experiments of M. Bon, in order to ascertain how far the proposed plan might be carried: but, after making the proper trials, M. Reaumur found it to be impracticable, on account of the natural disposition of these animals, which is such as will by no means admit of their living peaceably together in large numbers. M. Reaumur also computed that 663,522 spiders would scarcely furnish a single pound of silk. Monsieur Bon, however, the first projector, carried his experiments so far as to obtain two or three pairs of stockings and gloves of this silk, which were of an elegant gray colour, and were presented, as samples, to the Royal Academy. It must be observed, that in this manufacture it is the silk of the egg-bags alone that can be used, being far stronger than that of the webs. Monsieur Bon collected twelve or thirteen ounces of these, and having caused them to be well cleared of dust, by properly beating with sticks, he washed them perfectly clean in warm water. After this, they were laid to steep, in a large vessel, with soap, saltpetre, and gum-arabic. The whole was left to boil over a gentle fire for three hours, and was afterwards again washed to get out the soap; then laid to dry for some days, after which it was carded, but with much smaller cards than ordinary. The silk is easily spun into a fine and strong thread; the difficulty being only to collect the silk-bags in sufficient quantity.

There remains one more particularity in the history of spiders, viz. the power of flight. It is principally in the autumnal season that these diminutive adventurers ascend the air, and contribute to fill it with that infinity of floating cobwebs, which are so peculiarly conspicuous at that period of the year. When inclined to make these aerial excursions, the spider ascends some slight eminence, as the top of a wall, or the branch of a tree; and turning itself with its head towards the wind, protrudes several threads, and, rising from its station, commits itself to the gale, and is thus carried far beyond the height of the loftiest towers, and enjoys the pleasure of a clearer atmosphere. During their flight, it is probable that spiders employ themselves in catching such minute winged insects as may happen to occur in their progress; and when satisfied with their journey and their prey, they suffer themselves to fall, by contracting their limbs, and gradually disengaging themselves from the thread.

These insects are but ill calculated to live in society. Whenever thus stationed, they never fail to wage war with each other. The females, in particular, are of a disposition peculiarly capricious and malignant; and it is observed, that they sometimes spring upon the males, and destroy them. On this occasion, says Linnæus, if ever, may be justly applied the Ovidian line:—

Res est solliciti plena timoris amor!

The following is a notable instance of the **INGENUITY OF THE SPIDER**. T. A. Knight, Esq. of Herefordshire, has, in a Treatise on the Culture of the Apple and Pear, introduced the following concerning this curious insect.—

“I have frequently placed a spider on a small upright stick, whose base was surrounded by water, to observe its most singular mode of escape. After having discovered that the ordinary means of escape are cut off, it ascends the point of the stick, and, standing nearly on its head, ejects its web, which the wind readily carries to some contiguous object. Along this, the sagacious insect effects its escape, not however till it has previously ascertained, by several exertions of its whole strength, that its web is properly attached to the opposite end. I do not know that this instance of sagacity has been mentioned by any entomological writer, and I insert it here in consequence of the erroneous accounts of some periodical publications, of the spider’s threads, which are observed to pass from one tree or bush to another in dewy mornings.”

The reader will be pleased with the following account of **A SPIDER TAMED**, given by the Abbé d’Olivet, author of the *Life of Pelisson*, in the following passage:—

“ Confined at that time in a solitary place, and where the light of day only penetrated through a mere slit, having no other servant than a stupid and dull clown, a Basque, who was continually playing on the bagpipes, Pelisson studied by what means to secure himself against an enemy, which a good conscience alone cannot always repel; I mean, the attacks of unemployed imagination, which, when it once exceeds proper limits, becomes the most cruel torture of a recluse individual. He adopted the following stratagem:—Perceiving a spider spinning her web at the spiracle, he undertook to tame her; and to effect this, he placed some flies on the edge of the opening, while the Basque was playing on his favourite bagpipe. The spider by degrees accustomed herself to distinguish the sound of that instrument, and to run from her hole to seize her prey; thus, by means of always calling her out by the same tune, and placing the flies nearer and nearer his own seat, after several months’ exercise, he succeeded in training the spider so well, that she would start at the first signal, to seize a fly at the farthest end of the room, and even on the knees of the prisoner.”

It has been stated, that a prisoner confined in the Bastille, retained his senses, contrary to expectation, by playing daily so many games at push-pin; he having, unknown to his keepers, secreted a battalion or two of these hostile implements. The device of Pelisson is more interesting to us, as we learn from it, that the spider, though amongst the most quarrelsome of insects, yet is capable of being rendered familiar by the reason and perseverance of man.

In the introduction to a modern Entomology there is a description of the process by which the spider weaves its web. After describing the four spinners, as they are termed, from which the visible threads proceed, the writer makes the following curious observations:—“ These are machinery, through which, by a process more singular than that of rope-spinning, the thread is drawn. Each spinner is pierced, like the plate of a wire-drawer, with a multitude of holes, so numerous, and exquisitely fine, that a space often not larger than a pin’s point includes a thousand. Through each of these holes proceeds a thread of inconceivable tenuity, which, immediately after issuing from the orifice, unites with all the other threads from the spinner, into one. Hence, from each spinner proceeds a compound thread; and these four threads, at the distance of about one-tenth of an inch from the apex of the spinner, again unite, and form the thread we are accustomed to see, which the spider uses in forming its web. Thus, a spider’s web, even spun by the smallest species, and when so fine that it is almost imperceptible to our senses, is not, as we suppose, a straight line, but a rope, composed of at least 400 yarns.”

We shall close this chapter with a **CURIOUS ANECDOTE OF A SPIDER**, connected with observations on the utility of ants in destroying venomous creatures; by Captain Bagnold.

"Desirous of ascertaining the natural food of the scorpion, I inclosed one (which measured three-quarters of an inch from the head to the insertion of the tail) in a wide-mouthed phial, together with one of those large spiders so common in the West Indies, and closed it with a cork, perforated by a quill for the admission of air. The insects seemed carefully to avoid each other, retiring to opposite ends of the bottle, which was placed horizontally. By giving it a gradual inclination, the scorpion was forced into contact with the spider, when a sharp encounter took place, the latter receiving repeated stings from his venomous adversary, apparently without the least injury; while, with his web, he soon lashed the scorpion's tail to his back, and afterwards secured his legs and claws with the same materials. In this state I left them some time, in order to observe what effect would be produced on the spider, by the wounds he had received. On my return, however, I was disappointed, the ants having entered, and destroyed them both.

"In the West Indies I have daily witnessed crowds of these little insects destroying the spider or cockroach, which, as soon as he is dispatched, they carry to their nest. I have frequently seen them drag their prey perpendicularly up the wall and, although the weight would overcome their united efforts and fall to the ground, perhaps twenty times in succession, yet, by unremitting perseverance, and the aid of reinforcements, they always succeeded.

"A struggle of this description once amused the officers of his majesty's ship *Retribution*, for nearly half an hour: a large centipede entered the gun-room, surrounded by an immense concourse of ants; the deck, for four or five feet round, was covered with them; his body and limbs were encrusted with his lilliputian enemies; and although thousands were destroyed by his exertions to escape, they ultimately carried him in triumph to their dwelling.

"In the woods near Sierra Leone, I have several times seen the entire skeletons of the snake beautifully dissected by these minute anatomists."

From these circumstances it would appear, that ants are a considerable check to the increase of those venomous reptiles, so troublesome in the torrid zone; and their industry, perseverance, courage, and numerical force, seem to strengthen the conjecture: in which case they amply remunerate us for their own depredations.

CHAP. XXVII

CURIOSITIES RESPECTING INSECTS.—(*Continued.*)*Luminous Insects.*

MANY insects are possessed of a luminous preparation or secretion, which has all the advantages of our lamps and candles, without their inconveniences; which gives light sufficient to direct our motion; which is incapable of burning; and whose lustre is maintained without needing fresh supplies of oil, or the application of snuffers.

Of the insects thus singularly provided, the common GLOWWORM (*Lampyrus noctiluca*) is the most familiar instance.—This insect in shape somewhat resembles a caterpillar, only it is much more depressed; and the light proceeds from a pale-coloured patch that terminates, the under side of the abdomen.

It has been supposed by many, that the males of the different species of lampyrus do not possess the property of giving out any light; but it is now ascertained that this supposition is inaccurate, though their light is much less vivid than that of the female. Ray first pointed out this fact with respect to (*L. noctiluca.*) Geoffrey also observed, that the male of this species has four small luminous points, two on each of the two last segments of the belly: and his observation has been recently confirmed by Miller. This last entomologist, indeed, saw only two shining spots; but from the insects having the power of withdrawing them out of sight, so that not the smallest trace of light remains, he thinks it is not improbable that at times two other points, still smaller, may be exhibited, as Geoffrey has described. In the males of *L. splendidula*, and of *L. hemiptera*, the light is very distinct, and may be seen in the former while flying. The females have the same faculty of extinguishing or concealing their light; a very necessary provision to guard them from the attacks of nocturnal birds. Mr. White even thinks that they regularly put it out between eleven and twelve every night, and they have also the power of rendering it for a while more vivid than ordinary.

Though many of the females of the different species of lampyrus are without wings, and even elytra, (in *Coleoptera*,) this is not the case with all. The female of *L. Italica*, a species common in Italy, and which, if we may trust to the accuracy of the account given by Mr. Waller, in the Philosophical Transactions for 1684, would seem to have been taken by him

in Hertfordshire, is winged; and when a number of these moving stars are seen to dart through the air in a dark night, nothing can have a more beautiful effect. Dr. Smith says, that the beaus of Italy are accustomed in an evening to adorn the heads of the ladies with these artificial diamonds, by sticking them into their hair; and a similar custom prevails amongst the ladies of India.

Besides the golden species of the genus *Lampyrus*, all of which are probably more or less luminous, another insect of the beetle tribe, *Elater noctilucus*, is endowed with the same property, and that in a much higher degree. This insect, which is an inch long, and about one-third of an inch broad, gives out its principal light from two transparent eye-like tubercles placed upon the thorax; but there are also two luminous patches concealed under the elytra, which are not visible except when the insect is flying, at which time it appears adorned with four brilliant gems of the most beautiful golden-blue lustre: in fact, the whole body is full of light, which shines out between the abdominal segments when stretched. The light emitted by the two thoracic tubercles alone is so considerable, that the smallest print may be read by moving one of these insects along the lines; and in the West India islands, particularly in St. Domingo, where they are very common, the natives were formerly accustomed to employ those living lamps, which they called *cucuij* instead of candles, in performing their evening household occupations. In travelling at night, they used to tie one to each great toe; and in fishing and hunting, required no other flambeau.—*Pietro Martire's Decades of the New World, quoted in Madoc*, p. 543. Southey has happily introduced this insect in his "*Madoc*," as furnishing the lamp by which Coatel rescued the British hero from the hands of the Mexican priests.

"She beckon'd and descended, and drew out,
From underneath her vest, a cage, or net
It rather might be called, so fine the twigs
Which knit it, where, confined, two fire-flies gave
Their lustre. By that light did Madoc first
Behold the features of his lovely guide."

Pietro Martire tells us, that *cucuij* serve the natives of the Spanish West India islands not only instead of candles, but as extirpators of the gnats, which are a dreadful pest to the inhabitants of the low grounds. They introduce a few fire-flies, to which the gnats are a grateful food, into their houses, and by means of these "commodious hunters," are soon rid of the intruders. "How they are a remedy (says this author) for so great a mischief, it is a pleasant thing to hear. Hee who understandeth that he has those troublesome guesstes (the gnattes) at home, diligently hunteth after the *cucuij*. Whoso wanteth *cucuij*, goeth out of the house in the first twilight of

the night, carrying a burning fire-brand in his hand, and ascendeth the next hillock, that the cucuij may see it, and hee swingeth the fire-brand about, calling Cucuie aloud, and beating the ayre with often calling out, Cucuie, Cucuie." He goes on to observe, that the simple people believe the insect is attracted by their invitations; but that, for his part, he is rather inclined to think that the fire is the magnet. Having obtained a sufficient number of cucuij, the beetle-hunter returns home, and lets them fly loose in the house, where they diligently seek the gnats about the beds and the faces of those asleep, and devour them.—*Martire ubi sup. Colonies*, i. 128. These insects are also applied to purposes of decoration. On certain festival-days, in the month of June, they are collected in great numbers, and tied all over the garments of young people, who gallop through the streets on horses similarly ornamented, producing on a dark evening the effect of a large moving body of light. On such occasions, the lover displays his gallantry by decking his mistress with these living gems.—*Walton's Present State of the Spanish Colonies*. And according to P. Martire, "many wanton wilde fellowes" rub their faces with "the flesh of a killed cucuij," as boys with us use phosphorus, "with purpose to meet their neighbours with a flaming countenance," and derive amusement from their fright.

Besides *Elater noctilucus*, *E. ignitus*, and several others of the same genus, are luminous: not fewer than twelve species of this family are described by Illiger in the Berlin Naturalist Society's Magazine.

The brilliant nocturnal spectacle presented by these insects to the inhabitants of the countries where they abound, cannot be better described than in the language of the poet above referred to, who has thus related its first effect upon British visitors of the new world:

"———sorrowing we beheld
The night come on: but soon did night display
More wonders than it veil'd; innumerable tribes
From the wood-cover swarm'd, and darkness made
Their beauties visible; one while they stream'd
A bright blue radiance upon flowers that clos'd
Their gorgeous colours from the eye of day;
Now motionless and dark, eluding search,
Self-shrouded; and anon starring the sky,
Rose like a shower of fire."

If we are to believe Mouffet, (and the story is not incredible,) the appearance of the tropical fire-flies on one occasion led to a more important result than might have been expected from such a cause. He tells us, that when Sir Thos. Cavendish and Sir John Dudley first landed in the West Indies, and saw in the evening an infinite number of moving lights in the woods, which were merely these insects, they supposed that

the Spaniards were advancing upon them, and immediately betook themselves to their ships: a result as well entitling the elatera to a commemoration feast, as a similar good office by the land-crabs of Hispaniola, which, as the Spaniards tell, (and the story is confirmed by an anniversary *Fiesta de los Cangrejos*,) by their clattering being mistaken for the sound of Spanish cavalry close upon their heels, in like manner scared away a body of English invaders from the city of St. Domingo.—*Walton's Hispaniola*, i. 39.

An anecdote less improbable, perhaps, and certainly more ludicrous, is related by Sir James Smith, of the effect of the first sight of the Italian fire-flies upon some Moorish ladies, ignorant of such appearances. These females had been taken prisoners at sea, and, until they could be ransomed, lived in a house in the outskirts of Genoa, where they were frequently visited by the respectable inhabitants of the city; a party of whom, on going one evening, were surprised to find the house closely shut up, and their Moorish friends in the greatest grief and consternation. On inquiring into the cause, they ascertained that some of the *Lampyrus Italica* had found their way into the dwelling, and that the ladies within had taken it into their heads that these brilliant guests were no other than the troubled spirits of their relations; and some time elapsed before they could be divested of this idea. The common people in Italy have a superstition respecting these insects somewhat similar, believing that they are of a spiritual nature, and proceed out of the graves; and hence carefully avoid them.—*Tour on the Continent*, 2d ed. iii. 85.

The insects hitherto adverted to have been beetles, or of the order *Coleoptera*. But, besides these, a genus in the order *Hemiptera*, called *Fulgora*, includes several species, which emit so powerful a light, as to have obtained in English the generic appellation of lantern-flies. Two of the most conspicuous of this tribe are the *F. lanternaria* and *F. candelaria*; the former a native of South America, the latter of China. Both, as indeed is the case with the whole genus, have the material which diffuses their light included in a hollow subtransparent projection of the head. In *F. candelaria* this projection is of a subcylindrical shape, recurved at the apex, above an inch in length, and the thickness of a small quill. We may easily conceive, as travellers assure us, that a tree studded with multitudes of these living sparks, some at rest and others in motion, must during the night have a superlatively splendid appearance.

In *F. lanternaria*, which is an insect two or three inches long, the snout is much larger and broader, and more of an oval shape, and sheds a light, the brilliancy of which transcends that of any other luminous insect. Madam Merian

informs us, that the first discovery she made of this property caused her no small alarm. The servants had brought her several of these insects, which by day-light exhibited no extraordinary appearance, and she inclosed them in a box till she should have an opportunity of drawing them, placing them upon a table in her lodging-room. In the middle of the night the confined insects made such a noise as to awake her, and she opened the box, the inside of which, to her great astonishment, appeared all in a blaze; and in her fright letting it fall she was not less surprised to see each of the insects apparently on fire. She soon, however, divined the cause of this unexpected phenomenon, and re-inclosed her brilliant guests in their place of confinement. She adds, that the light of one of these fulgora was sufficiently bright to read a newspaper by. Another species, *F. pyrrhorynchus*, is described by Donovan, in his *Insects of India*; of which the light, though from a smaller snout than that of *F. lanternaria*, must assume a more splendid and striking appearance, the projection being of a rich deep purple from the base to near the apex, which is of a fine transparent scarlet; and these tints will of course be imparted to the transmitted light.

With regard to the immediate source of the luminous properties of these insects, Mr. Macartney, to whom we are indebted for the most recent investigation on the subject, has ascertained, that in the common glow-worm, and in *Elater noctilucus* and *ignitus*, the light proceeds from masses of a substance not generally differing, except in its yellow colour, from the interstitial substance *corps graisseux*, of the rest of the body, closely applied underneath those transparent parts of the insects' skin which afford the light. In the glowworm, besides the last-mentioned substance, which, when the season for giving light is passed, is absorbed, and replaced by the common interstitial substance, he observed on the inner side of the last abdominal segment two minute oval sacks, formed of an elastic spirally-wound fibre, similar to that of the tracheæ, containing a soft yellow substance, of a closer texture than that which lines the adjoining region, and affording a more permanent and brilliant light. This light he found to be less under the control of the insect than that from the adjoining luminous substance, which it has the power of voluntarily extinguishing, not by retracting it under a membrane, as Caradori imagined, but by some inscrutable change which depends upon its will: and when the latter substance was extracted from living glowworms, it afforded no light, while the two sacks in like circumstances shone uninterruptedly for several hours. Mr. Macartney conceives, from the radiated structure of interstitial substance surrounding the oval yellow masses immediately under the transparent spot in the thorax

of *Elater noctilucus*, and the subtransparency of the adjoining crust, that the interstitial substance in this situation has also the property of shining; a supposition which, if De Geer and other authors be correct in stating, that this insect has two luminous patches over its elytra, and that the incisures between the abdominal segments shine when stretched, may probably be extended to the whole of the interstitial substance of its body.

With respect to the remote cause of the luminous property of insects, philosophers are considerably divided in opinion. The disciples of modern chemistry have in general, with Dr. Darwin, referred it to the slow combustion of some combination of phosphorus secreted from their fluids by an appropriate organization, and entering into combination with the oxygen supplied in respiration. This opinion is very plausibly built upon the ascertained existence of phosphoric acid as an animal secretion; the great resemblance between the light of phosphorus in slow combustion, and animal light; the remarkably large spiracula in glowworms; and upon the statement, that the glowworm is rendered more brilliant by the application of heat and oxygen gas, and is extinguished by cold and by hydrogen and carbonic acid gases. From these last facts, Spallanzani was led to regard the luminous matter as a compound of hydrogen and carburetted hydrogen gas. Carradori having found that the luminous portion of the belly of the Italian glowworm, *lampyrus Italica*, shone in vacuo, in oil, in water, and when under other circumstances where the presence of oxygen gas was precluded,—with Brugnatelli, ascribed the property in question to the imbibition of light, separated from the food or air taken in the body, and afterwards secreted in a sensible form.* Lastly, Mr. Macartney having ascertained, by experiment, that the light of a glowworm is not diminished by immersion in water, or increased by the application of heat; that the substance affording it, though poetically employed for lighting the fairies' tapers,† is incapable of inflammation, if applied to the flame of a candle or red-hot iron; and when separated from the body, exhibits no sensible heat on the thermometer's being applied to it,—rejects the preceding hypothesis as unsatisfactory, but without substituting any other explanation; suggesting, however, that the facts he observed are more favourable to the supposition of light being a quality of matter, than a substance.

Which of these opinions is the more correct, is left for future philosophers to decide.

* *Annal. di Chimica*, xliii. 1797, Mag. ii. 80.

† “And for night-tapers crop their waxen thighs,
And light them at the fiery glowworm's eyes.”

The general use of this singular provision is not much more satisfactorily ascertained than its nature. It is conjectured that it may be a means of defence against its enemies. In different kinds of insects, however, it may probably have a different object. Thus in the lantern-flies, (*Fulgora*,) whose light precedes them, it may act the part that their name imports, enable them to discover their prey, and to steer themselves safely in the night. In the fire-flies, (*Elater*,) if we consider the infinite numbers, that in certain climates and situations present themselves every where in the night, it may distract the attention of their enemies, or alarm them. And in the glowworm, since their light is usually more brilliant in the female, it is most probably intended to conduct the sexes to each other.

Thine is an unobtrusive blaze,
Content in lowly shades to shine;
And much I wish, while yet I gaze,
To make thy modest merit mine!

Mrs. Opie.



CHAP. XXVIII.

CURIOSITIES RESPECTING INSECTS—(*Continued.*)

The Flea—On the Duration of the Life of a Flea—The Louse.

THE FLEA,—has two eyes and six feet, fitted for leaping; the feelers are like threads; the rostrum is inflected, setaceous, and armed with a sting; and the belly is compressed. Fleas bring forth eggs, which they deposit on animals that afford them a proper food. Of these eggs are hatched white worms of a shining pearl colour, which feed on the scurfy substance of the cuticle, the downy matter gathered in the piles or folds of clothes, or other similar substances. In a fortnight they come to a tolerable size, and are very lively and active; and, if at any time disturbed, they suddenly roll themselves into a kind of ball. Soon after this, they come to creep, after the manner of silk-worms, with a very swift motion. When arrived at their size, they hide themselves as much as possible, and spin a silken thread out of their mouth, wherewith they form themselves a small round bag, or case, white within as paper, but without always dirty, and fouled with dust. Here, after a fortnight's rest, the animalcule bursts out, transformed into a perfect flea, leaving its exuviae in the bag. While

it remains in the bag, it is milk-white till the second day before its eruption, when it becomes coloured, grows hard, and gets strength; so that, upon its first delivery, it springs nimbly away. The flea is covered all over with black, hard, and shelly scales or plates, which are curiously jointed, and folded over each other in such a manner as to comply with all the nimble motions of the creature. These scales are finely polished, and beset about the edges with short spikes, in a very beautiful and regular order. Its neck is finely arched, and resembles the tail of a lobster: the head is also very extraordinary; for from the snout-part of it proceed the two fore-legs, and between these is placed the piercer, or sucker, with which it penetrates the skin to get its food. Its eyes are very large and beautiful, and it has two short horns, or feelers. It has four other legs, joined all at the breast. These, when it leaps, fold short, one within another; and then, exerting their spring all at the same instant, they carry the creature to a surprising distance. The legs have several joints, are very hairy, and terminate in two long and hooked sharp claws. The piercer, or sucker, of the flea, is lodged between its fore-legs, and includes a couple of darts or lancets, which, after the piercer has made an entrance, are thrust farther into the flesh, to make the blood flow from the adjacent parts, and occasion that round red spot, with a hole in the centre of it, vulgarly called a flea-bite.

This piercer, its sheath opening sidewise, and the two lancets within it, are very difficult to be seen, unless the two fore-legs, between which they are hid, be cut off close to the head; for the flea rarely puts out its piercer, except at the time of feeding, but keeps it folded inwards; and the best way of seeing it, is by cutting off first the head, and then the fore-legs, and then it is usually seen thrust out in convulsions. By keeping fleas in a glass tube corked up at both ends, but so as to admit fresh air, their several actions may be observed. They may be thus seen to lay their eggs, &c. They do not lay their eggs all at once, but by ten or twelve in a day, for several days successively, which eggs will be afterwards found to hatch successively, in the same order. The flea may easily be dissected in a drop of water; and thus the stomach and bowels, with their peristaltic motion, may be discovered very plainly, with the veins and arteries, though minute beyond all conception. This bloodthirsty insect, which fattens at the expense of the human species, prefers the more delicate skin of women, but preys neither upon epileptic persons, nor upon the dead or dying. It loves to nestle in the fur of dogs, cats, and rats. The nests of river-swallows are sometimes plentifully stored with them. Fleas are apterous, walk but little, but leap to a height equal to two hundred times that

of their own body. This amazing motion is performed by means of the elasticity of their feet, the articulations of which are so many springs. Thus it eludes, with surprising agility, the pursuit of the person on whom it riots. Mercurial ointment, brimstone, a fumigation with the leaves of pennyroyal, or fresh-gathered leaves of that plant, sewed up in a bag, and laid in the bed, are remedies pointed out as destructive of fleas.

In the Athenian Oracle, a lady desires to know whether fleas have stings, or whether they only suck or bite, when they draw blood from the body? To which an ingenious author returns the following humorous answer:

“Not to trouble you, madam, with the Hebrew or Arabic name of a flea, or to transcribe Bochart’s learned dissertations on the little animal, we shall, for your satisfaction, give such a description thereof as we have yet been able to discover.—

“Its skin is of a lovely deep red colour, most neatly polished, and armed with scales, which can resist any thing but fate, and your ladyship’s unmerciful fingers: the neck of it is exactly like the tail of a lobster, and, by the assistance of those strong scales it is covered with, springs backwards and forwards much in the same manner, and with equal violence: it has two eyes on each side of its head, so pretty, that I would prefer them to any, madam, but yours; and which it makes use of to avoid its fate, and flee from its enemies, with as much nimbleness and success, as your sex manage those fatal weapons, lovely basilisks as you are, for the ruin of your adorers. Nature has provided it six substantial legs, of great strength, and incomparable agility, jointed like a cane, covered with large hairs, and armed each of them with two claws, which appear of a horny substance, more sharp than lancets, or the finest needle you have in your needle-book. It was a long while before we could discover its mouth, which, we confess, we have not yet so exactly perceived as we could wish, the little bashful creature always holding up its two fore-feet before it, which it uses instead of a fan or mask, when it has no mind to be known; and we were forced to be guilty of an act both uncivil and cruel, without which we could never have resolved your question. We were obliged to unmask this modest one, and cut off its two fore-legs to get to the face; which being performed, though it makes our tender hearts, as well as yours, almost bleed to think of it, we immediately discovered what your ladyship desired, and found Nature had given it a strong proboscis, or trunk, as a gnat or muschetto, though much thicker and stouter, with which we may very well suppose it penetrates your fair hand, feasts itself on the nectar of your blood, and then, like a little faithless fugitive of a lover, skips away, almost invisibly, nobody knows whither.”

We close our remarks on this well-known insect, with the following interesting particulars on the DURATION OF THE LIFE OF A FLEA; by Borrichius; from the Acts of Copenhagen.—“Pliny represents to us a Greek philosopher, whose chief occupation, for several years together, was to measure the space skipped over by fleas. Without giving in to such ridiculous researches, I can relate an anecdote, which chance discovered to me in regard to this insect.

“Being sent for to attend a foreign lady, who was greatly afflicted with the gout, and having staid, by her desire, to dine with her, she bade me take notice of a flea on her hand. Surprised at such discourse, I looked at the hand, and saw indeed a plump and pampered flea sucking greedily, and kept fast to it by a little gold chain. The lady assured me, she had nursed and kept the little animal, at that time, full six years, with exceeding great care, having fed it twice every day with her blood; and when it had satisfied its appetite, she put it up in a little box, lined with silk. In a month’s time, being recovered from her illness, she set out from Copenhagen with her flea; but having returned in about a year after, I took an opportunity of waiting upon her, and, among other things, asked after her little insect. She answered me with great concern, that it died through the neglect of her waiting-woman. What I found remarkable in this story was, that the lady, being attacked by chronical pains in her limbs, had recourse in France to very powerful medicines during six weeks; and all this time the flea had not ceased to feed upon her blood, imbued with the vapours, and yet was not the worse for it.”

THE LOUSE.—This insect has six feet, two eyes, and a sort of sting in the mouth; the feelers are as long as the thorax; and the belly is depressed and sublobated. It is an oviparous animal. They are not peculiar to man alone, but infest other animals, as quadrupeds and birds, and even fishes and vegetables; but these are of peculiar species on each animal, according to the particular nature of each, some of which are different from those which infest the human body. Nay, even insects are infested with vermin, which feed on and torment them. Several kinds of beetles are subject to lice, but particularly that kind called by way of eminence the lousy beetle. The lice on this are very numerous, and will not be shook off. The earwig is often infested with lice, just at the setting on of its head: these are white and shining, like mites, but they are much smaller; they are round-backed, flat-bellied, and have long legs, particularly the foremost pair. Snails of all kinds, but especially the large naked sorts, are very subject to lice; which are continually seen running about them, and

devouring them. Numbers of little red lice, with a very small head, and in shape resembling a tortoise, are often seen about the legs of spiders, and they never leave the animal while he lives; but if he be killed, they almost instantly forsake him. A sort of whitish lice is found on humblebees; they are also found upon ants; and fishes are not less subject to them than other animals. Kircher tells us, that he found lice also on flies, and M. de la Hire has given a curious account of the creature which he found on the common fly. Having occasion to view a living fly with the microscope, he observed on its head, back, and shoulders, a great number of small animals crawling very nimbly about, and often climbing up the hairs which grow at the origin of the fly's legs. He with a fine needle took up one of these, and placed it before the microscope used to view the animalcules in fluids. It had eight legs, four on each side; these were not placed very distant from each other, but the four towards the head were separated by a small space from the four towards the tail. The feet were of a particular structure, being composed of several fingers, as it were, and fitted for taking fast hold of any thing, but the two nearest the head were also more remarkable in this particular than those near the tail; the extremities of the legs for a little way above the feet were dry, and void of flesh, like the legs of birds, but above this part they appeared plump and fleshy. It had two small horns upon its head, formed of several hairs arranged closely together; and there were some other clusters of hairs by the side of these horns, but they had not the same figure; and towards the origin of the hind-legs there were two other such clusters of hairs, which took their origin at the middle of the back. The whole creature was of a bright yellowish red; the legs, and all the body, except a large spot in the centre, were perfectly transparent. In size, he computed it to be about $\frac{1}{1000}$ th part of the head of the fly; and he observes, that such kind of vermin are rarely found on flies.

The louse which infests the human body, makes a very curious appearance through a microscope. It has such a transparent shell or skin, that we are able to discover more of what passes within its body, than in most other living creatures. It has naturally three divisions, the head, the breast, and the tail part. In the head appear two fine black eyes, with a horn that has five joints, and is surrounded with hairs standing before each eye; and from the end of the nose, or snout, there is a pointed projecting part, which serves as a sheath or case to a piercer, or sucker, which the creature thrusts into the skin to draw out the blood and humours which are its destined food; for it has no mouth that opens in the common way. This piercer, or sucker, is judged to be

seven hundred times smaller than a hair, and is contained in another case within the first, and can be drawn in or thrust out at pleasure. The breast is very beautifully marked in the middle; the skin is transparent, and full of little pits; and from the under part of it proceed six legs, each having five joints, and their skin all the way resembling shagreen, except at the ends, where it is smoother. Each leg is terminated by two claws, which are hooked, and are of an unequal length and size. These it uses as we would a thumb and middle finger; and there are hairs between these claws, as well as all over the legs. On the back part of the tail there may be discovered some ring-like divisions, and a sort of marks which look like the strokes of a rod on the human skin; the belly looks like shagreen, and towards the lower end it is very clear, and full of pits: at the extremity of the tail there are two semicircular parts, all covered over with hairs. When the louse moves its legs, the motion of the muscles, which all unite in an oblong dark spot in the middle of the breast, may be distinguished perfectly; and so may the motion of the muscles of the head, when it moves its horns. We may likewise see the various ramifications of the veins and arteries, which are white, with the pulse regularly beating in the arteries. The peristaltic motion of the intestines may be distinctly seen, from the stomach down to the anus.

If one of these creatures, when hungry, be placed on the back of the hand, it will thrust its sucker into the skin, and the blood which it sucks may be seen passing in a fine stream to the fore part of the head; where, falling into a roundish cavity, it passes again in a fine stream to another circular receptacle in the middle of the head; from thence it runs through a small vessel to the breast, and then to a gut which reaches to the hinder part of the body, where, in a curve, it turns again a little upward in the breast and gut; the blood is moved without intermission with great force, especially in the former, where it occasions a surprising contraction.

In the upper part of the crooked ascending gut above-mentioned, the propelled blood stands still, and seems to undergo a separation, some of it becoming clear and waterish, while other black particles are pushed forward to the anus. If a louse is placed on its back, two bloody darkish spots appear; the larger in the middle of the body, the smaller towards the tail; the motions of which are followed by the pulsation of the dark bloody spot, in or over which the white bladder seems to lie. This motion of the systole and diastole is best seen when the creature begins to grow weak; and on pricking the white bladder, which seems to be the heart, it instantly dies. The lower dark spot is supposed to be the excrement.

CHAP. XXIX.

CURIOSITIES RESPECTING INSECTS.—(*Continued.*)

In the vast, and the minute, we see
 Th' unambiguous footsteps of a God,
 Who gives its lustre to an insect's wing,
 And wheels his throne upon the rolling worlds. *Cowper.*

THE APHIS.

THIS is an insect which has engaged the attention of naturalists for various reasons: their generation is equivocal, and their instinctive economy differs, in some respects, from that of most other animals. Linnæus defines the generic character of the aphis thus: beak inflected, sheath of five articulations, with a single bristle; antennæ setaceous, and longer than the thorax; either four erect wings, or none; feet formed for walking; posterior part of the abdomen usually furnished with two little horns. Geoffroy says, the aphides have two beaks, one of which is seated in the breast, the other in the head; this last extends to, and is laid upon, the base of the pectoral one, and serves, as that writer imagines, to convey to the head a part of that nourishment which the insect takes or sucks in by means of the pectoral beak.

Gmelin enumerates about seventy species, all of which, and doubtless many others, are found in different parts of Europe. They infest an endless variety of plants; and it is believed that each species is particularly attached to one kind of vegetable only: hence each sort has been hitherto named after the individual species or genus of plants on which it feeds; or if that could not be ascertained, that on which it had been found; for some species are rather uncommon and little known, though others are infinitely too numerous. The aphides are sufficiently known by the indiscriminate term of plant-lice; they abound with a sweet and grateful moisture, and are therefore eagerly devoured by ants, the larvæ coccinellæ, and many other creatures, or they would become, very probably, more destructive to the whole vegetable creation than any other race of insects known. If Bonnet was not the first naturalist (as is generally acknowledged) who discovered the mysterious course of generation in the aphides, or, as he calls them, pucerons, his experiments, together with those of his countryman, Trembley, tended at least to confirm, in a most satisfactory manner, the almost incredible circumstances respecting it, that an aphis, or puceron, brought up in the most perfect solitude from the moment of its birth, in a few days will be found in the midst of a

numerous family ; and that if the experiment be again repeated on one of the individuals of this family, a second generation will multiply like its parent ; and the like experiment may be many times repeated with the same effect.

The history of aphides has also been very copiously treated upon by Dr. Richardson, in a paper printed in the 41st vol. of the Philosophical Transactions, and by the late ingenious Mr. Curtis, in the 6th vol. of the Transactions of the Linnæan Society. The tenor of Dr. Richardson's remarks is briefly this : The great variety of species which occur in the insects now under consideration, may render an inquiry into their particular natures not a little perplexing ; but by reducing them under their proper genus, the difficulty is considerably diminished. We may reasonably suppose all the insects comprehended under any distinct genus, to partake of one general nature ; and by diligently examining any particular species, we may thence gain some insight into the nature of all the rest. With this view, Dr. Richardson chose out of the various sorts of aphides, the largest of those found on the rose-tree ; not only as its size makes it more conspicuous, but as there are few of so long duration. This sort appears early in the spring, and continues late in autumn ; while several are limited to a much shorter term, in conformity to the different trees and plants whence they draw their nourishment.

If, at the beginning of February, the weather happens to be so warm as to make the buds of the rose-tree swell and appear green, small aphides are frequently to be found on them, though not larger than the young ones in summer, when first produced. It will be found, that those aphides which appear only in spring, proceed from small black oval eggs, which were deposited on the last year's shoot ; though it happens that, when the insects make too early an appearance, the greater part suffer from the sharp weather that usually succeeds, by which means the rose-trees are some years freed from them. The same kind of animal is then at one time of the year viviparous, and at another oviparous. Those aphides which withstand the severity of the weather, seldom come to their full growth before the month of April, at which time they usually begin to breed, after twice casting off their exuvia, or outward covering.

When they first come from the parent, they are enveloped in a thin membrane, having the appearance of an oval egg ; these egg-like appearances adhere by one extremity to the mother, while the young ones contained in them extend to the other, and by that means gradually draw the ruptured membrane over the head and body to the hind-feet. Being thus suspended in the air, the insect soon frees itself from the membrane in which 't was confined, and, after its limbs are

a little strengthened, is set down on some tender shoots, and left to provide for itself. In the spring months there appear on the rose-trees but two generations of aphides, including those which proceed immediately from the last year's eggs; the warmth of the summer adds so much to their fertility that no less than five generations succeed each other in the interval. One is produced in May, which casts off their covering; while the months of June and July each supply two more, which cast off their coverings three or four times, according to the different warmth of the season. This frequent change of their outward coat is the more extraordinary, because it is repeated more often when the insects come the soonest to their growth, which sometimes happens in ten days, when they have had plenty of warmth and nourishment. Early in the month of June, some of the third generation, which were produced about the middle of May, after casting off the last covering, discover four erect wings, much longer than their bodies; and the same is observable in all the succeeding generations which are produced during the summer months, but, like all the others, without any diversity of sex: for some time before the aphides come to their full growth, it is easy to distinguish which will have wings, by a remarkable fulness of the breast, which in the others is hardly to be distinguished from the body. When the last covering is ejected, the wings, which were before folded up in a very narrow compass, are gradually extended in a surprising manner, till their dimensions are at last very considerable. The increase of these insects in the summer time is so very great, that by wounding and exhausting the tender shoots, they would frequently suppress all vegetation, had they not many enemies to restrain them.

Notwithstanding these insects have a numerous tribe of enemies, they are not without their friends, if those may be considered as such, who are officious in their attendance, for the good things they expect to reap thereby. The ant and bee are of this kind, collecting the honey in which the aphides abound, but with this difference, that the ants are constant visitors, the bee only when flowers are scarce; the ants will suck in the honey while the aphides are in the act of discharging it; the bees only collect it from the leaves on which it has fallen. In the autumn, three more generations of aphides are produced, two of which generally make their appearance in the month of August, and the third before the middle of September. The two first differ in no respect from those which are found in summer, but the third differs greatly from all the rest.

Though all the aphides which have hitherto appeared were female, in this generation several male insects are found, but not by any means so numerous as the females. The females

have, at first, the same appearance as those of the former generations, but in a few days their colour changes from a green to a yellow, which is gradually converted into an orange before they come to their full growth; they differ also, in another respect, from those which occur in summer, for all these yellow females are without wings. The male insects are, however, still more remarkable, their outward appearance readily distinguishing them from this and all other generations. When first produced, they are not of a green colour like the rest, but of a reddish brown, and have afterwards a dark line along the back; they come to their full growth in about three weeks, and then cast off their last covering, the whole insect being, after this, of a bright yellow colour, the wings only excepted, but after this change they become a deeper yellow, and, in a very few hours, of a dark brown, if we except the body, which is something lighter coloured, and has a reddish cast. Where there are a number crowded together, they of course interfere with each other, in which case they will frequently deposit their eggs on other parts of the branches. It is highly probable that the aphides derive considerable advantages by living in society: the reiterated punctures of a great number of them may attract a larger quantity of nutritious juices to that part of the tree or plant where they have taken up their abode.

The observations of Mr. Curtis, on the aphides, are chiefly intended to shew that they are the principal cause of blights in plants, and the sole cause of the honey-dew. He therefore calls this insect the aphis, or blighter; and after observing, that, in point of numbers, the individuals of the several species composing it surpass those of any other genus in the country, speaks thus, in general terms, of the whole tribe.—“These insects live entirely on vegetables. The loftiest tree is no less liable to their attacks, than the most humble plant. They prefer the young shoots on account of their tenderness, and, on this principle, often insinuate themselves into the very heart of the plant, and do irreparable mischief before they are discovered. But, for the most part, they beset the foliage, and are always found on the under side of the leaf, which they prefer, not only on account of its being the most tender, but as it affords them protection from the weather, and various injuries to which they would otherwise be exposed. Sometimes the root is the object of their choice, which, from the nature of these insects, one would not, *à priori*, expect: yet I have seen the roots of lettuces thickly beset with them, and the whole crop rendered sickly and of little value; but such instances are rare. They seldom attach themselves to the bark of trees, like the aphis salicis, which being one of our largest species, and hence possessing superior strength, is

enabled to penetrate a substance harder than the leaves themselves.

In the quality of the excrement voided by these insects, there is something wonderfully extraordinary. Were a person accidentally to take up a book, in which it is gravely asserted, that in some countries there were certain animals that voided liquid sugar, he would lay it down, regarding it as a fabulous tale, calculated to impose on the credulity of the ignorant; and yet such is literally the truth. Mr. Curtis collected some on a piece of writing-paper, from a brood of the *aphis salicis*, and found it to be as sweet as sugar; and observes, that were it not for the wasps, ants, flies, and other insects, that devour it as quickly as it is produced, it might, no doubt, be collected in considerable quantities, and, by the processes used with other saccharine juices, might be converted into the choicest sugar or sugar-candy. The sweetness of this excrementitious substance, the glossy appearance it gave the leaves it fell upon, and the swarms of insects this matter attracts, led him to imagine the honey-dew of plants was no other than this secretion, which further observation has since been fully confirmed; and not, as its name implies, a sweet substance falling from the atmosphere. On this opinion it is further remarked, that it neither falls from the atmosphere, nor issues from the plant itself, as is easily demonstrated. If it fell from the atmosphere, it would cover every thing it fell upon indiscriminately; whereas we never find it but on certain living plants and trees. We find it also on plants in stoves and green-houses covered with glass. If it exuded from the plant, it would appear on all the leaves generally and uniformly; whereas its appearance is extremely irregular, not alike on any two leaves of the same tree or plant, some having none of it, and others being covered with it but partially.

It is probable that there never exists any honey-dew but where there are aphides; though such often pass unnoticed, being hidden on the under side of the leaf: and wherever honey is observable upon a leaf, aphides will be found on the under side of the leaf or leaves immediately above it, and under no other circumstance whatever. If by accident any thing should intervene between the aphides and the leaf next beneath them, there will be no honey-dew on that leaf: and thus he conceives it is incontrovertibly proved, that aphides are the true and only source of honey-dew.

Of the British species of aphides, one of the largest and most remarkable is the *aphis salicis*, which is found on the different kinds of willows. When bruised, these insects stain the fingers with red. Towards the end of September, multitudes of the full-grown insects of this species, both with and without wings, desert the willows on which they feed, and

ramble over every neighbouring object in such numbers, that we can handle nothing in their vicinity without crushing some of them; while those in a younger or less advanced state, still remain in large masses upon the trees. *Aphis rosæ* is very frequent, during the summer months, on young shoots and buds of roses; it is of a bright green colour: the males are furnished with large transparent wings. *Aphis vitis* is most destructive to vines, as *Aphis ulmi* is to the elm-tree.

It is found that where the saccharine substance has dropped from aphides for a length of time, as from the *aphis salicis* in particular, it gives to the surface of the bark, foliage, &c. that sooty kind of appearance which arises from the explosion of gunpowder; it looks like, and is sometimes taken for, a kind of black mildew. In most seasons, the natural enemies of the aphid are sufficient to keep them in check, and to prevent them from doing essential injury to plants in the open air; but there are times, once perhaps in four, five, or six years, in which they are multiplied to such an excess, that the usual means of diminution fail in preventing them from doing irreparable injury to certain crops.

To prevent the calamities which would infallibly result from an accumulated multiplication of the more prolific animals, it has been ordained by the Author of nature, that such should be diminished by serving as food for others. On this principle, most animals of this kind have one or more natural enemies. The helpless aphid, which is the scourge of the vegetable kingdom, has to contend with many: the principal are the coccinella, the ichneumon aphidum, and the musca aphidivora. The greatest destroyer of the aphides is the coccinella, or common lady-bird.

During the winter, this insect secures itself under the bark of trees, and elsewhere. When the spring expands the foliage of plants, the female deposits her eggs on them in great numbers, from whence, in a short time, proceeds the larva, a small grub, of a dark lead-colour, spotted with orange. These may be observed in summer running pretty briskly over all kinds of plants; and, if narrowly watched, they will be found to devour the aphides wherever they find them. The same may be observed of the lady-bird, in its perfect state. Another most formidable enemy to the aphid, is a very minute, black, and slender ichneumon fly, which eats its way out of the aphid, leaving the dry inflated skin of the insect adhering to the leaf like a small pearl: such may always be found where aphides are in plenty. Different species of aphides are infested with different ichneumons. There is scarcely a division of nature, in which the musca, or fly, is not found: of these, one division, the aphidivora, feeds entirely on aphides.

Of the different species of aphidivorous flies, which are

numerous, having mostly bodies variegated with transverse stripes, their females may be seen hovering over plants infested with aphides, among which they deposit their eggs on the surface of the leaf. The larva, or maggot, produced from such eggs, feeds, as soon as hatched, on the younger kinds of aphids, and, as it increases in size, attacks and devours those which are larger. The larva of the *hemerolicus* feeds also on the aphides, and deposits its eggs on the leaves of such plants as are beset with them. The earwig is likewise an enemy to them, especially such as reside in the curled leaves of fruit-trees, and the purses formed by certain aphides on the poplars and other trees. To these may be added the smaller soft-billed birds that feed on insects.



CHAP. XXX.

CURIOSITIES RESPECTING INSECTS.—(Continued.)

*The Common House Fly—The Hessian Fly—The May Fly—
The Vegetable Fly—The Boat Fly—The Ephemeral Flies—
Butterflies—Metamorphoses of Insects—The Death-Watch.*

What atom-forms of insect life appear!

And who can follow Nature's pencil here?

Their wings with azure, green, and purple gloss'd,

Studded with colour'd eyes, with gems emboss'd;

Inlaid with pearl, and mark'd with various stains

Of lively crimson through their dusky veins.

Barbauld.

THE COMMON HOUSE FLY.

GORDART has reckoned up forty-eight varieties of the fly, without including them all in this enumeration. The multitude of these lively insects, which the first genial sunshine calls forth into life, has limits which the human eye is incapable of exploring. The female fly is easily distinguishable from the male: she is larger than the latter, fuller in the body, of a lighter colour, and, when she is nearly ready to deposit her eggs, the abdomen is so transparent, that they may be perceived lying on both sides, opposite to each other. Nature has instructed her not to deposit her eggs in dry, but in damp substances, which keep them from being dried up, and at the same time afford nourishment to the maggot or worm. The latter issues from the egg generally in twenty-four hours, but, in the sun, within twelve hours after it is laid. About half an hour before, annular circles become visible in the egg, an undulatory motion succeeds, the egg opens at the end, and

the worm makes its appearance. Its entrance into the world is extremely tedious; for the three or four minutes taken by the worm to work its way out of the egg, are, for it, certainly so many days. It is endowed, on the other hand, with vital powers, which enable it to defy inconveniences which cost other animals their lives. Nothing but turpentine, the general destroyer of insects, kills it in half an hour. On the fourteenth or fifteenth day, it begins to prepare for its transformation into a nymph, and in this form appears at first of a light yellow, and afterwards of a dark red. You would take it, in this state, for some kind of seed, rather than for the habitation of a living creature. The change of the nymph into a fly requires as much time as the preceding transformation. A thrust with the head then bursts the prison in which it is confined, and the fly, perfectly formed, sallies forth. The sun hastens its birth, which is then the business of but a moment; but in unfavourable weather, this probably painful operation often takes four or five hours. The insect is now as perfect as its parents, and not to be distinguished from them. As soon as it issues from the nymph, it flies away; and only those are unable to use their wings immediately, which have the misfortune to come out in gloomy weather.

Leuwenhock reckons, that every fly has eight thousand hexagons or eyes, on each of the hemispheres composing its face, and consequently sixteen thousand on both. M. Von Gleichen, a German naturalist, observes, that the law of retaliation is in some measure established, in regard to these animals; for if they annoy us, they are in their turn persecuted by others. Small yellow insects, discovered by means of the magnifying glass, crawling among the hairs that grow on their bodies, are supposed to be destined for this purpose.

The fecundity of flies is prodigious. On this head, the last-mentioned naturalist has made the following calculation:—

A fly lays four times during the summer, each time eighty eggs, which makes	320
Half of these are supposed to be females, so that each of the four broods produces forty:	
1. First eighth, or the forty females of the first brood, also lay four times in the course of the summer, which makes	12,800
The first eighth of these, or 1,600 females, three times	384,000
The second eighth, twice	256,000
The third and fourth eighth, at least one each	256,000
Carried forward	900 120

Brought forward	909,120
2. The second eighth, or the forty females of the second brood, lay three times, the produce of which is	9,600
One sixth of these, or 1,600 females, three times....	384,000
The second sixth, twice	256,000
The third sixth, once	128,000
3. The third eighth, or the forty females of the third brood, lay twice, and produce.....	6,400
One fourth of these, or 1,600 females, lay twice more	256,000
4. The fourth eighth, or forty females of the fourth brood, once	3,200
Half of these, or 1,600 females, at least once.....	128,000
Total produce of a single fly, in one summer.....	2,080,320

Another curious insect is, THE HESSIAN FLY.—This is a very mischievous insect, which a few years ago appeared in North America, and whose depredations threatened then to destroy the crops of wheat in that country entirely. It is, in its perfect state, a small winged insect, but the mischief it does, is while in the form of a caterpillar; and the difficulty of destroying it is increased, by its being as yet unknown where it deposits its eggs, to be hatched before the first appearance of the caterpillars. These mischievous insects begin their depredations in autumn, as soon as the wheat begins to shoot up through the ground. They devour the tender leaf and stem with great voracity, and continue to do so till stopped by the frost; but no sooner is this obstacle removed by the warmth of the spring, than the fly appears again, laying its eggs now, as has been supposed, upon the stems of the wheat just beginning to spire. The caterpillars hatched from these eggs, perforate the stems of the remaining plants at the joints, and lodge themselves in the hollow within the corn, which shews no sign of disease till the ears begin to turn heavy. The stems then break, and being no longer able to perform their office in supporting and supplying the ears with nourishment, the corn perishes about the time that it goes into a milky state. These insects attack also rye, barley, and timothy-grass, though they seem to prefer wheat. The destruction occasioned by them, is described in the *American Museum*, (published at Philadelphia,) for Feb. 1787, in the following words:—

“It is well known that all the crops of wheat in all the land over which it has extended, have fallen before it, and that the farmers beyond it dread its approach: the prospect is.

that unless means are discovered to prevent its progress, the whole continent will be overrun;—a calamity more to be dreaded, than the ravages of war.” This terrible insect appeared first in Long Island, during the American war, and was supposed to have been brought from Germany by the Hessians; whence its name. From thence it proceeded inland at the rate of about fifteen or twenty miles annually; and, in 1789, had reached two hundred miles from the place where it was first observed. At that time it continued to proceed with unabating increase; being apparently stopped neither by rivers nor mountains. In the fly state it is likewise exceedingly troublesome, by getting into houses in swarms, falling into victuals and drink, filling the windows, and flying perpetually into the candles.

THE MAY FLY.—This insect is called the May fly, from its annual appearance in that month. It lies all the year, except a few days, at the bottom or sides of rivers, nearly resembling the nymph of the small libella; but when it is mature, it rises up to the surface of the water, and splits open its case; then, with great agility, up springs the new animal, having a slender body, with four black-veined, transparent, shining wings, with four black spots in the upper wings; the under wings are much smaller than the upper ones; and with three long hairs in its tail.

The husk it leaves behind floats upon the water. After this creature is discharged from the water, it flies about to find a proper place to fix on, (as trees, bushes, &c.) to wait for its approaching change, which is effected in two or three days.

The first hint I received of this wonderful operation, was by seeing their exuviae hanging on a hedge. I then collected a great many, and put them into boxes; and by strictly observing them, I could tell when they were ready for this surprising change.

I had the pleasure to shew my friends one, which I held in my fingers all the time it performed this great work; it was surprising to see how easily the back part of the fly split open, and produced the astonishing transformation. In the new fly, a remarkable difference is seen in their sexes, which is not so easy to be perceived in their first state, the male and female being much of a size; but afterwards the male is much the smallest, and the hairs of their tails much the longest.

When the females are about to deposit their eggs, they seek the rivers, keeping constantly playing up and down upon the water. It is very plainly seen, that every time they dart down, they eject a cluster of eggs, which appears like a little

bluish speck, or a small drop of milk, as they sink to the bottom of the river. Thus they continue until they have spent their strength, being so weak, that they can rise no more, but fall a prey to the fish. But by much the greatest number perish on the waters, which are covered with them. This is the end of the females. The males never resort to the river, but, after a time, drop down, languish, and die, under the trees and bushes.

The species of libella abounds most with females, which is very necessary, considering the many enemies they have in their short appearance; for both birds and fishes are fond of them, and, no doubt, under water they are the prey of aquatic animals.

What is further surprising in this remarkable creature is, that during a life which consists only of three or four days, it eats nothing, and seems to have no apparatus for this purpose, but brings up with it, out of the water, sufficient support to enable it to shed its skin, and perform the principal ends of life with great vivacity.

THE VEGETABLE FLY.—This is a very curious natural production, chiefly found in the West Indies. It resembles the drone, both in size and colour, more than any other British insect, excepting that it has no wings. "In the month of May, it buries itself in the earth, and begins to vegetate. By the end of July, the tree has arrived at its full growth, and resembles a coral branch; it is about three inches in height, and bears several little pods, which, dropping off, become worms, and thence flies, like the British caterpillar." Such was the account originally given of this extraordinary production. But several boxes of these flies having been sent to Dr. Hill for examination, his report was as follows:—"There is in Martinique a fungus of the clavaria kind, different in species from those hitherto known. It produces soboles from its sides; I call it therefore *clavaria sobolifera*. It grows on putrid animal bodies, as our fungus (*ex pede equino*) from the dead horse's hoof. The cicada is common in Martinique, and in its nymph state, in which the old authors call it *tettigometra*, it buries itself under the dead leaves, to await its change; and, when the season is unfavourable, many perish. The seeds of the clavaria find a proper bed in these dead insects, and grow. The *tettigometra* is among the cicada in the British Museum; the clavaria is but just now known. This is the fact, and all the fact; though the untaught inhabitants suppose a fly to vegetate, and though there is a Spanish drawing of the plants growing into a trifoliate tree; and it has been figured with the creature flying with this tree upon its back."—Thus does ignorance delight in the marvellous!

THE BOAT FLY.—This insect, called *Notonecta glauca*, is thus described by Barbut. “It has a head somewhat round, of which the eyes seem to take up the greatest part. These eyes are brown, and very large, the rest of the head being yellow. In the fore-part it has a sharp trunk, that projects, and is inflected between the fore feet. On the sides are seen the antennæ, very small, yellowish, and which spring from under the head. The thorax, which is broad, short, and smooth, is yellow on the fore, and black on the back part. The escutcheon is large, of a rough black, and as it were nappy. The elytra, rather large, and crossed over each other, are a mixture of brown and yellow, not unlike the colour of rust, which makes it look cloudy. The under part of the body is brown; and at the extremity of the abdomen are to be seen a few hairs. The feet, six in number, are of a light brown, the two hindermost having on the leg and tarsus hairs that give them the shape of fins, nor are they terminated by nails. The four anterior ones are somewhat flat, and serve the animal to swim with; but at their extremity they have nails, and no hairs. This insect is seen in stagnating waters, where it swims on its back, and presents its abdomen upwards; for which reason it has been called by the Greek name of *notonecta*. The hinder feet, longer than the rest, serve it as paddles. It is very nimble, and dives down when you go to take hold of it; after which, it rises again to the surface of the water. It must be cautiously handled, if one would avoid being pricked by it, for the point of its rostrum is exceedingly sharp, and intolerably painful, but it goes off in a few minutes. The larva very much resembles the perfect insect.”

Such is the account that Mr. Barbut gives of this beautiful nimble little creature. To this account, however, we shall add the following:—Its legs are long; when taken out of the water, it hops; it is very common in the ponds of water in Hyde Park, and in several other places about London. It is of a very particular form, being flattish at the belly, and rising to a ridge on the middle of the back; so that when it swims, which is almost always on the back, its body has much the resemblance of a boat in figure,—whence its vulgar name. It is eight lines long, three broad, and two and a half thick. The belly is jointed, striated, and, as Barbut observes, hairy. Nature has provided it with an offensive weapon resembling a sting, which it thrusts out when hurt, from a large opening at the tail. The head is large and hard; the eyes nearly of a triangular form. The nose is a long, green, hollow proboscis, ending in a hard and sharp point, which in its natural posture remains under the belly, and reaches to the middle pair of legs. The outer part of its

wings are of a pale flesh-colour, with spots of a dead white; these are long, narrow, and somewhat transparent; they terminate in a roundish point, and perfectly cover the whole body. The triangular piece which stands between the top of the wings is hard, and perfectly black; the inner wings are broader and shorter than the outer ones; they are thin and perfectly transparent, and are of a pale pearl-colour. The hinder pair being greatly longer than all the rest, they serve as oars; and nature has tufted them with hair at the end for that purpose. This creature mostly lives in the water, where it preys on small insects, killing them, and sucking their juices with its proboscis, in the manner of the water scorpion and many other aquatic insects: it seizes its prey violently, and darts with incredible swiftness to a considerable distance after it.

Though it generally lives in the water, it sometimes, however, crawls out in good weather; and drying its wings by expanding them in the sun, takes flight, and becomes an inhabitant of the air, not to be known as the same creature, unless to those who had accurately observed it before: when tired of flying, or in danger of an enemy, it immediately plunges into the water. We are told that there are fourteen species of it, seven of which are common in Europe, in waters, &c.

EPHEMERAL FLIES.—This species of insect is named ephemeral, because of its very short existence in the fly state. It is one of the most beautiful species of flies, and undergoes five changes. At first, the egg contains its vital principle; it comes forth a small caterpillar, which is transformed into a chrysalis, then into a nympha, and lastly, into a fly, which deposits its eggs upon the surface of water, where the sun's rays bring them to life. Each egg produces a little red worm, which moves in a serpentine manner. They are found in abundance during the summer, in ponds and marshes; and as soon as cold weather sets in, the little worm makes for itself a shell or lodging, where it passes the winter; at the end of which it ceases to be a worm, and enters into its third state, that of a chrysalis. It then sleeps till spring, and gradually becomes a beautiful nympha, or a sort of mummy, something in the form of a fish. At the time of its metamorphosis, the nympha at first seems inactive and lifeless; in six days, the head appears, raising itself gradually above the surface of the water; the body next disengages itself slowly and by degrees, till at length the whole animal comes out of its shell. The newborn fly remains for some minutes motionless upon the water, then gradually revives, and feebly shakes its wings, then moves them quicker, and attempts first to walk, then to fly. As

these insects are all hatched nearly at the same time, they are seen in swarms for a few hours flitting and playing upon the surface of the water; they then lay their eggs, and soon after die. Thus they terminate their short life in the space of a few hours, and the same day that saw them born, witnesses their death.

THE BUTTERFLY.

Behold, ye pilgrims of this earth, behold!
 See all but man with unearn'd pleasure gay
 See her bright robes the butterfly unfold,
 Broke from her wintry tomb in prime of May:
 What youthful bride can equal her array?
 Who can with her for easy pleasure vie?
 From mead to mead with gentle wing to stray,
 From flower to flower on balmy gales to fly,
 Is all she has to do beneath the radiant sky.

Thomson

The first thing which fixes our attention on beholding these aerial inhabitants, is, the clothing with which they are adorned. Yet some of them have nothing in this respect to engage our notice, their vestment is simple and uniform; others have a few ornaments on the wings; but with some, those ornaments amount to profusion, and they are covered with them all over. This last species will occupy us for a short interval. How beautiful are the gradations of colour which decorate them! what harmony in those spots which relieve the other parts of their attire! with what delicacy has nature pencilled them! But, whatever may be my admiration when I consider this insect by the naked eye, how greatly is it augmented, when I behold this beautiful object through the medium of the microscope! Would any one ever have imagined, that the wings of butterflies were furnished with feathers? Nothing, however, is more true; and what we commonly call dust, is found in reality to be feathers. Their structure and arrangement are adjusted to as perfect symmetry, as their colours are soft and brilliant. The parts which form the centre of these little feathers, and which immediately touch the wing, are the strongest; those, on the contrary, which compose the exterior circumference, are much more delicate, and of an extraordinary fineness. All these feathers have a quill at their base, but the superior part is more transparent than the quill from which it proceeds. If we lay hold of the wing too rudely, we destroy the most delicate part of the feathers; but if we remove all that we term dust, there remains only a thin transparent skin, where may be distinguished the little orifices in which the quill of each feather was lodged. This skin, from the nature of its texture, may be as easily discerned from the rest of the wing, as a fine gauze from the cloth on which it is

fastened, it is more porous, more delicate, and seems as if embroidered by the needle; to complete its beauty, its extremity finishes by a fringe, whose minute threads succeed each other with the utmost regularity.

What are our most laboured dresses, what is all their boasted ornament, in comparison of that refined tissue with which nature has invested this simple insect? Our finest laces are only like coarse cloth, when brought to vie with that luxurious clothing which covers the wings of the butterfly; and our smallest thread, by their infinitely delicate fibres, swells into hempen cord. Such is the wonderful difference to be observed between the works of nature and those of art, when viewed through a microscope. The former are finished to all imaginable perfection; the others, even the most beautiful of their kind, appear incomplete and coarsely wrought. How fine a piece of delicate cambric appears to us! nothing more slender than the threads, nothing more uniform than the texture: and yet in the microscope these threads resemble hempen strings, and we should rather be tempted to believe that they had been interlaced by the hand of a basket-maker, than wrought on the loom of a skilful weaver.

What is most astonishing in this brilliant insect, is, that it proceeds from a worm, than which nothing has a more abject and vile appearance. Behold how the butterfly displays to the sun his splendid wings, how he sports in his rays, how he rejoices in his existence, and, in respiring the vernal airs, how he flutters in the meadow from flower to flower. His rich wings present to us the magnificence of the rainbow. How beautiful is he now, who but a little while ago crept a worm in the dust, in perpetual danger of being crushed to death! Who has raised him above the earth? Who has given to him the faculty of inhabiting the ethereal regions? Who has furnished him with his painted wings? It is God.

In down of ev'ry variegated dye,
Shines, flutt'ring soft, the gaudy butterfly;
That powder, which thy spoiling hand distains,
The form of quills and painted plumes contains:
Not courts can more magnificence express,
In all their blaze of gems and pomp of dress.

Browne.

Their wings, all glorious to behold,
Bedropt with azure, jet, and gold,
Wide they display; the spangled dew
Reflects their eyes and various hue.

Gay.

We shall now briefly describe THE METAMORPHOSES OF INSECTS. And first, THE BUTTERFLY:

From form to form they pass in wondrous change. *Virgil.*

At the first exclusion from the egg, and for some months of its existence afterwards the creature which is to become a

butterfly, is a worm-like caterpillar, crawling upon sixteen short legs, greedily devouring leaves with two jaws, and seeing by means of twelve eyes, so minute, as to be nearly imperceptible without the aid of a microscope. We now view it furnished with wings capable of rapid and extensive flights; of its sixteen feet, ten have disappeared, and the remaining six are in most respects wholly unlike those to which they have succeeded; its jaws having vanished, are replaced by a curled-up proboscis, suited only for sipping liquid sweets; the form of its head is entirely changed, two long horns projecting from its upper surface; and, instead of twelve invisible eyes, you behold two, very large, and composed of at least twenty thousand convex lenses, each supposed to be a distinct and effective eye!

Were we to push our examination further, and, by dissection, to compare the internal conformation of the caterpillar with that of the butterfly, we should witness changes even more extraordinary. In the former we should find some thousands of muscles, which in the latter are replaced by others, of a form and structure entirely different. Nearly the whole body of the caterpillar is occupied by a capacious stomach. In the butterfly, this has become converted into an almost imperceptible thread-like viscus; and the abdomen is now filled by two large packets of eggs, or other organs, not visible in the first state. In the former, two spirally-convoluted tubes were filled with a silky gum; in the latter, both tubes and silk have almost totally vanished, and changes equally great have taken place in the economy and structure of the nerves and other organs.

What a surprising transformation! Nor was this all. The change from one form to the other was not direct; an intermediate state, not less singular, intervened. After casting its skin, even to its very jaws, several times, and attaining its full growth, the caterpillar attached itself to a leaf by a silken girth. Its body became greatly contracted; its skin once more split asunder, and disclosed an oviform mass, without exterior mouth, eyes, or limbs, and exhibiting no other symptom of life than a slight motion when touched. In this state of death-like torpor, and without tasting food, the insect existed for several months, until at length the tomb burst, and out of a case not more than an inch long, and a quarter of an inch in diameter, proceeded the butterfly, which covers a surface of nearly four inches square.

THE COMMON FLY.—This winged insect, whose delicate palate selects out the choicest viands, one while extending his proboscis to the margin of a drop of wine, and then gaily flying to take a more solid repast from a pear or a peach,

now gambolling with his comrades in the air, now gracefully carrying his furred wings with his taper feet;—was but the other day a disgusting grub, without wings, without legs, without eyes, wallowing, well pleased, in the midst of a mass of excrement.

THE GREYCOATED GNAT.—This creature, whose humming salutation, while she makes her airy circles about our bed, gives terrific warning of the sanguinary operation in which she is ready to engage, was a few hours ago the inhabitant of a stagnant pool, more in shape like a fish than an insect. Then to have been taken out of the water would have been speedily fatal; now it could as little exist in any other element than air. Then it breathed through its tail; now through openings in its sides. Its shapeless head, in that period of its existence, is now exchanged for one adorned with elegantly tufted antennæ, and furnished, instead of jaws, with an apparatus more artfully constructed than the cupping-glasses of the phlebotomist; an apparatus, which, at the same time that it strikes in the lancets, composes a tube for pumping up the flowing blood.

THE SHARDHORN BEETLE.—This species of beetle, whose sullen hum, as he directs his droning flight close past our ears in our evening walk, was not in his infancy an inhabitant of air, the first period of his life being spent in gloomy solitude, as a grub, under the surface of the earth. The shapeless maggot, which we scarcely fail to meet with in some one of every handful of nuts we crack, would not always have grovelled in that humble state. If our unlucky intrusion upon its vaulted dwelling had not left it to perish in the wide world, it would have continued to reside there until its full growth had been attained. Then it would have gnawed itself an opening, and, having entered the earth, and passed a few months in a state of inaction, would at length have emerged an elegant beetle, furnished with a slender and very long ebony beak; two wings, and two wing-cases, ornamented with yellow bands; six feet; and in every respect unlike the worm from which it proceeded.

THE DEATH-WATCH.—This appalling name is applied to a harmless, diminutive insect, because it emits a sound resembling the ticking of a watch, and is supposed to predict the death of some one of the family, in the house in which it is heard. Thus sings the muse of the witty Dean of St. Patrick on this subject:—

“————— A wood worm
That lies in old wood, like a hare in her form:

With teeth or with claws, it will bite or will scratch,
 And chambermaids christen this worm a death-watch;
 Because like a watch it always cries click:
 Then woe be to those in the house who are sick!
 For, sure as a gun, they will give up the ghost,
 If the maggot cries click, when it scratches the post:
 But a kettle of scalding-hot water injected
 Infallibly cures the timber affected;
 The omen is broken, the danger is over,
 The maggot will die, and the sick will recover."

To add to the effect of this noise, it is said to be made only when there is a profound silence in an apartment, and every one is still.

Authors were formerly not agreed concerning the insect from which this sound of terror proceeded, some attributing it to a kind of woodlouse, and others to a spider; but it is now a received opinion, adopted upon satisfactory evidence, that it is produced by some little beetles belonging to the timber-boring genus, *Anobium*, F. Swammerdam observes, that a small beetle, which he had in his collection, having firmly fixed its fore-legs, and put its inflexed head between them, makes a continual noise in old pieces of wood, walls, and ceilings, which is sometimes so loud, that upon hearing it, people have fancied that hobgoblins, ghosts, or fairies, were wandering around them. Evidently this was one of the death-watches. Latreille observed *Anobium striatum*, F. produce the sound in question, by a stroke of its mandibles upon the wood, which was answered by a similar noise from within it. But the species whose proceedings have been most noticed by British observers, is, *A. tessellatum*, F. When spring is far advanced, these insects are said to commence their ticking, which is only a call to each other, to which, if no answer be returned, the animal repeats it in another place. It is thus produced: Raising itself upon its hind-legs, with the body somewhat inclined, it beats its head with great force and agility upon the plane of its position; and its strokes are so powerful, as to make a considerable impression if they fall upon any substance softer than wood. The general number of distinct strokes in succession, is from seven to nine or eleven; they follow each other quickly, and are repeated at uncertain intervals. In old houses, where these insects abound, they may be heard in warm weather during the whole day. The noise exactly resembles that produced by tapping moderately with the nail upon a table; and, when familiarized, the insect will answer very readily the tap of the nail.

CHAP. XXXI.

CURIOSITIES RESPECTING INSECTS.—(*Continued.*)*Locusts and Mosquitoes, and their Uses in the Creation;—from Kirby, Spence, and Fothergill.*

LOCUSTS.—If we could discover the use of every animal in the creation, we should gain a very clear insight into the grand designs of the Almighty, respecting creatures inferior to ourselves, and perceive the immediate cause and necessity of their existence, and how far we have a right to interfere with their economy. That man should ever attain the whole extent of this knowledge, in this state of existence, can scarcely be hoped for; but, that he may learn much, there can be no doubt.

Because the utility of some animals, in a general view, is not palpably obvious, we ought not pettishly or hopelessly to give up the inquiry. Some of the most numerous are apparently the most noxious, and the least useful, as the locust (*gryllus migratorius*) for example. It has never been my fortune to visit countries subject to the devastations of these insects; and the travellers who describe them, seem, either through want of inclination, or astonishment at the desolating effects produced by their incursions, unable to give those facts which an industrious and attentive naturalist, with enlarged views, might collect and apply to some useful purpose; for there can be no doubt that Infinite Wisdom would not have permitted these insects to be so numerous as they are, if their existence was not absolutely necessary. To look at a locust in a cabinet of insects, we should not, at first sight, deem it capable of being the source of so much evil to mankind as stands on record against it. Yet, although this animal be not very tremendous for its size, nor very terrific in its appearance, it is the very same whose ravages have been the theme of naturalists and historians in all ages, and, upon a close examination, it will be found to be peculiarly fitted and furnished for the execution of its office.

It is armed with two pair of very strong jaws, the upper terminating in short, and the lower in long teeth, by which it can both lacerate and grind its food; its stomach is of extraordinary capacity and powers; its hind-legs enable it to leap to a considerable distance, and its ample vans are calculated to catch the wind as sails, and so carry it sometimes over the sea; and although a single individual can effect but little evil, yet, when the entire surface of a country is covered

by them, and every one makes bare the spot on which it stands, the mischief produced may be as extensive as their numbers. So well do the Arabians know their power, that they make a locust say to Mahomet, "We are the army of the Great God; we produce ninety-nine eggs: if the hundred were completed, we should consume the whole earth, and all that is in it."—*Bochart*.

The earliest plague produced by the locusts, which has been recorded, appears also to have been the most direful in its immediate effects, that ever was inflicted upon any nation. It is that with which the Egyptian tyrant and his people were visited for their oppression of the Israelites. Only conceive of a country so covered by them, that no one can see the face of the ground—a whole land darkened, and all its produce, whether herb or trees, so devoured, that not the least vestige of green is left in either.—*Exod.* x. 5, 14, 15. But it is not necessary to enlarge upon a history, the circumstances of which are so well known. To this species of devastation, Africa in general seems always to have been peculiarly subject. This may be gathered from the law in Cyrenaica mentioned by Pliny, by which the inhabitants were enjoined to destroy the locusts in three different states, three times in the year; first their eggs, then their young, and lastly the perfect insect.* And not without reason was such a law enacted; for Orosius tells us, that in the year of the world 3,800, Africa was infested by such infinite myriads of these animals, that, having devoured every green thing, after flying off to sea they were drowned, and, being cast upon the shore, they emitted a stench greater than could have been produced by the carcasses of 100,000 men!—*Oros. contra Pag.* l. v. c. 2. St. Augustine also mentions a plague to have arisen in that country from the same cause, which destroyed no less than 800,000 persons (*octoginta hominum millia*) in the kingdom of Masanissa alone, and many more in the territories bordering upon the sea.—*Less.* l. 247. note 46. From Africa this plague was occasionally imported into Italy and Spain; and an historian quoted in Mouffet relates, that in the year 591 an infinite army of locusts, of a size unusually large, grievously ravaged part of Italy; and being at last cast into the sea, from their stench arose a pestilence which carried off near a million of men and beasts. In the Venetian territory also, in the year 1478, more than 30,000 persons are said to have perished in a famine occasioned by these terrific scourges. Many other instances of their devastations in Europe, in France, Spain, Italy, Germany, and other countries,

* *Hist. Nat.* l. xi. c. 29. A similar law was enacted in Lemnos, by which every one was compelled to bring a certain measure of locusts annually to the magistrates *Plin.*

are recorded by the same author. In 1650 a cloud of them was seen to enter Russia in three different places, which from thence passed over into Poland and Lithuania, where the air was darkened by their numbers. In some places they were seen lying dead, heaped one upon another to the depth of four feet; in others they covered the surface like a black cloth, the trees bent with their weight; and the damage they did exceeded all computation.—*Bingley*, iii. 258. At a later period, in Languedoc, when the sun became hot, they took wing, and fell upon the corn, devouring both leaf and ear, and that with such expedition, that in three hours they would consume a whole field. After having eaten up the corn, they attacked the vines, the pulse, the willows, and lastly, the hemp, notwithstanding its bitterness.—*Philos. Trans.* 1686. Sir H. Davy informs us (*Elements of Agricultural Chemistry*, 233,) that the French government in 1813 issued a decree with a view to occasion the destruction of grasshoppers.

Even this happy island, so remarkably distinguished by its exemption from most of those scourges to which other nations are exposed, was once alarmed by the appearance of locusts. In 1748 they were observed here in considerable numbers, but providentially they soon perished without propagating. These were evidently stragglers from the vast swarms which in the preceding year did such infinite damage in Wallachia, Moldavia, Transylvania, Hungary, and Poland. One of these swarms, which entered Transylvania in August, was several hundred fathoms in width, (at Vienna the breadth of one of them was three miles,) and extended to so great a length, as to be four hours in passing over the Red Tower; and such was its density, that it totally intercepted the solar light, so that when they flew low, one person could not see another at the distance of twenty paces.—*Philos. Trans.* xlv. 30. A similar account has been given by Major Moor, long resident in India. He relates, that when at Poonah, he was witness to an immense army of locusts which ravaged the Mahratta country, and was supposed to come from Arabia: this, if correct, is a strong proof of their power to pass the sea under favourable circumstances. The column they composed, extended five hundred miles; and so compact was it, when on the wing, that, like an eclipse, it completely hid the sun, so that no shadow was cast by any object; and some lofty tombs, distant from his residence not more than two hundred yards, were rendered quite invisible. This was not the *Gryllus migratorius*, L. but a red species; which circumstance much increased the horror of the scene, for, clustering upon the trees after they had stripped them of their foliage, they imparted to them a sanguine hue. The peach was the last tree they touched.

Dr. Clarke, to give some idea of the infinite numbers of these animals, compares them to a flight of snow when the flakes are carried obliquely by the wind. They covered his carriage and horses; and the Tartars assert, that people are sometimes suffocated by them. The whole face of nature might have been described as covered by a living veil. They consisted of two species, *G. tartaricus*, and *migratorius*, L.; the first is almost twice the size of the second, and, because it precedes it, is called by the Tartars, the herald or messenger.—*Travels*, i. 348. The account of another traveller, Mr. Barrow, of their ravages in the southern parts of Africa, in 1784, and 1797, is still more striking: an area of nearly two thousand square miles might be said literally to be covered by them. When driven into the sea by a N. W. wind, they formed upon the shore, for fifty miles, a bank three or four feet high; and when the wind was S. E. the stench was so powerful, as to be smelt at the distance of a hundred and fifty miles.—*Travels*, &c. 257.

From 1778 to 1780, the empire of Morocco was terribly devastated by them; every green thing was eaten up, not even the bitter bark of the orange and pomegranate escaping. A most dreadful famine ensued: the poor were seen to wander over the country, deriving a miserable subsistence from the roots of plants; and women and children followed the camels, from whose dung they picked the undigested grains of barley, which they devoured with avidity: in consequence of this, vast numbers perished, and the roads and streets exhibited the unburied carcasses of the dead. On this sad occasion, fathers sold their children, and husbands their wives.—*Southey's Thalaba*, i. 171.

When they visit a country, (says Mr. Jackson, speaking of the same empire,) it behoves every one to lay in provision for a famine, for they stay from three to seven years. When they have devoured all other vegetables, they attack the trees, consuming first the leaves and then the bark. From Mogadar to Tangier, before the plague in 1799, the face of the earth was covered by them: at that time a singular incident occurred at El Arisch. The whole region from the confines of Sahara was ravaged by them; but on the other side of the river El Kos, not one of them was to be seen, though there was nothing to prevent their flying over it. Till then, they had proceeded northward; but, upon arriving at its banks, they turned to the east, though all the country north of Arisch was full of pulse, fruits, and grain, exhibiting a most striking contrast to the desolation of the adjoining district. At length they were all carried by a violent hurricane into the western ocean; the shore, as in former instances, was covered by their carcasses, and a pestilence was caused

by the horrid stench which they emitted : but when this evil ceased, their devastations were followed by a most abundant crop. The Arabs of the desert, " whose hands are against every man," *Gen.* xvi. 12. and who rejoice in the evil that befalls other nations, when they behold the clouds of locusts proceeding from the north, are filled with gladness, anticipating a general mortality, which they call *el khere*, (the benediction;) for, when a country is thus laid waste, they emerge from their arid deserts, and pitch their tents in the desolated plains.—*Jackson's Travels in Morocco*, 54.

The noise the locusts make when engaged in the work of destruction, has been compared to the sound of a flame of fire driven by the wind, and the effect of their bite to that of fire.—*Bochart*. A poet of our own day has very strikingly described the noise produced by their flight and approach:—

Onward they came, a dark continuous cloud
Of congregated myriads, numberless,
The rushing of whose wings was as the sound
Of a broad river, headlong in its course
Plung'd from a mountain summit, or the roar
Of a wild ocean in the autumn storm,
Shattering its billows on a shore of rocks!

Southey's Thalaba, i. 169.

But no account of the appearance and ravages of these terrific insects, for correctness and sublimity, comes near to that of the prophet Joel : " A day of darkness and of gloominess, a day of clouds and of thick darkness, as the morning spread upon the mountains : a great people and a strong; there hath not been ever the like, neither shall be any more after it, even to the years of many generations. A fire devoureth before them; and behind them a flame burneth : the land is as the garden of Eden before them, and behind them a desolate wilderness; yea, and nothing shall escape them. The appearance of them is as the appearance of horses; and as horsemen, so shall they run. Like the noise of chariots* on the tops of mountains shall they leap, like the noise of a flame of fire that devoureth the stubble, as a strong people set in battle-array. Before **their** face the people shall be much pained; all faces shall gather blackness. They shall run like mighty men; they shall climb the wall like men of war; and they shall march every one on his ways, and they shall not break their ranks : neither shall one thrust another; they shall walk every one in his path : and when they fall upon the sword, they shall not be wounded. They shall run to and fro in the city; they shall run upon the wall, they shall

* Of the symbolical locusts in the Apocalypse it is said, " And the sound of their wings was as the sound of chariots of many horses running to battle."—*Rev.* ix. 9.

climb up upon the houses; they shall enter in at the windows like a thief. The earth shall quake before them, the heavens shall tremble: the sun and the moon shall be dark, and the stars shall withdraw their shining!" The usual way in which they are destroyed, is also noticed by the prophet. "I will remove far off from you the northern army, and will drive him into a land barren and desolate, with his face toward the east sea, and his hinder part toward the utmost sea, and his stink shall come up, because he hath done great things!"—*Joel* ii. 2—10, 20.

The best method of destroying locusts, would be to recommend them as an article of food. In the Crimea, they are often eaten by the inhabitants. Some French emigrants, who had been directed in this manner, assured me, that when fried, they were very palatable and very wholesome. The Arabs, according to Hasselquist, eat them roasted, and are glad to get them.

It is quite certain that there is nothing endued by nature with peculiar functions, in vain; and it is equally certain, that matter, however modified, whether in the form of animated or inanimated bodies, is continually undergoing change. The more deeply we investigate the works of creation, the more strong will be our conviction of these truths.

We know that many animals, and particularly insects, have apparently no other employment, than that of clearing or purifying the surface of the earth of superfluous matter, the residuum of decayed bodies, or of reconverting it into useful forms, as I shall attempt to illustrate hereafter. Now, if we survey those regions which give birth to, and support, the vast clouds of locusts alluded to, our view will be confined principally to the extensive deserts of Africa and Asia; the vegetation of many of which, according to the reports of travellers, is abundant and luxuriant, beyond the conception of those who have not beheld them; insomuch, that the crops of grass, and other annual vegetables, absolutely load the earth; and these, perishing upon each other, would form an impenetrable, putrid mass, if not consumed by some animals appointed for the purpose.

That locusts support existence by vegetable food, is well known; but whether they have no other object than to consume the superabundant produce of the regions they frequent, and to procreate, is not so easily proved. One who has had no opportunity of witnessing their manners, from their birth to their final destruction, can scarcely be able positively to decide; but I have no doubt that an intelligent naturalist, (governed by the principles this chapter is intended, in some measure, to illustrate,) with the necessary opportunities, such as Dr. Shaw, in particular, had, would be able to get at facts

that would indisputably prove the existence of locusts to be a blessing rather than a curse.

Whatever may be the direct object of their existence, locusts are of great use to many other animals, for there are some, particularly birds, that entirely prey upon them; and, if man himself refuses this food, it is rather from the prejudice, perhaps, of an absurd education, than from any improper or bad quality of the food itself.* The inhabitants of several eastern nations have a relish for this diet: and it is recorded of him who cried in the wilderness, "Prepare ye the way of the Lord," that "his meat was locusts and wild honey."—*Matthew* iii. 4. After this, we cannot listen to the feeble remonstrances of any modern epicure.

MOSQUITOES, AND THEIR USES.—The mosquito is accounted one of the most noxious and the most numerous of insects; at least of such as are esteemed noxious by the vulgar and the ignorant. In some countries, indeed, their numbers, and the effects produced by them, are wonderful. There is no instance on record more striking than the following, as related by Dr. Clarke:—

"No contrivance on our part could prevent millions of mosquitoes from filling the inside of our carriage, which, in spite of gloves, clothes, and handkerchiefs, rendered our bodies one entire wound. The Cossacks light numerous fires, to drive them from the cattle during the night; but so insatiate is their thirst of blood, that hundreds will attack a person attempting to shelter himself even in the midst of smoke. At the same time, the noise they make in flying cannot be conceived by persons who have only been accustomed to the humming of such insects in our country."—"Almost exhausted by fatigue, pain, and heat, I sought shelter in the carriage, sitting in water and mud. It was the most sultry night I ever experienced; not a breath of air was stirring; nor could I venture to open the windows, though almost suffocated, through fear of the mosquitoes. Swarms, nevertheless, found their way to my hiding-place; and when I opened my mouth, it was filled with them. My head was bound in handkerchiefs; yet they forced their way into my ears and nostrils. In the midst of this torment, I succeeded in lighting a lamp over the sword-case; which was instantly extinguished by such a prodigious number of these insects, that their dead bodies actually remained heaped in a large cone over the burner for several days afterward: and I know

* Shaw says, that the *gryllus cristatus*, which is five or six times the size of the common locust, or *gryllus migratorius*, is publicly sold, both in a fresh and salted state, in the markets of some parts of the Levant. *Ger. Zoology*, vol. vi. part. ii. p. 138.

not any mode of description which can convey a more adequate idea of their afflicting visitation, than by simply relating this fact: to the truth of which, those who travelled with me, and who are now living, bear indisputable testimony."

Those who have laboured under so painful a visitation, as that to which this lively account refers, may not perhaps be so ready to admit the general utility of these irritating insects, though their usefulness is more evident, and far more easily proved, than that of the locust, or indeed of most other animals of a similar nature. Bred in the midst of stagnant pools, of bogs, and marshes, in regions unwholesome to man, and where the effluvia arising from animal bodies, and from rank decaying vegetable substances, are so abundant, as to form thick pestilential vapours, that would inflict almost instant destruction on the human inhabitant, and most other creatures, if not removed as quickly as they were formed;—bred in such regions, and gifted with functions and propensities directed to the proper ends, the mosquito supports its existence by consuming the noxious particles exhaled from the swamps; and the bodies of animals, as rapidly as they are generated;—thereby preventing that horrible putrefaction of the air, and consequent pestilence, which would infallibly take place, if the mosquitoes, and similar insects, were not employed to purify the atmosphere.



CHAP. XXXII.

CURIOSITIES RESPECTING INSECTS.—(*Concluded.*)

Animalcules—The Cheese Mite—The Hydra, or Polypes.

The smallest creature in existence
Has limbs and sinews, blood, and heart, and brain,
Life and her proper functions to sustain,
Through the whole fabric, smaller than a grain!
What more can our penurious reason grant
To the large whale, or castled elephant;—
To those enormous terrors of the Nile,
The crested snake, and long-tail'd crocodile;—
Than that all differ but in shape and name,
Each destin'd to a less or larger frame? *Prior's Solomon.*

ANIMALCULES.

THE microscope discovers legions of animalcules in most liquors, as water, vinegar, beer, dew, &c. They are also found in rain, and several chalybeate waters, and in infusions of both animal and vegetable substances, as the seminal fluids

of animals, pepper, oats, wheat, and other grain, tea, &c. &c. The contemplation of animalcules has rendered the term, *infinitely* small bodies, extremely familiar to us. A mite was anciently thought the limits of littleness; but we are not now surprised, to be told of animals twenty-seven millions of times smaller than a mite. Minute animals are found proportionably much stronger, more active and vivacious, than large ones. The spring of a flea in its leap, how vastly does it outskip any thing the larger animals are capable of! A mite, how vastly swifter does it run than a race-horse! M. De. L'Isle has given the computation of the velocity of a little creature, scarcely visible by its smallness; which he found to run three inches in half a second: supposing now its feet to be the fifteenth part of a line, it must make five hundred steps in the space of three inches; that is, it must shift its legs five hundred times in a second, or in the ordinary pulsation of an artery. The excessive minuteness of microscopical animalcules conceals them from the human eye. One of the wonders of modern philosophy is, to have invented means for bringing objects, to us so imperceptible, under our cognizance and inspection: creatures, a thousand times too little to be able to affect our sense, should seem to have been very safe; yet we have extended our views over animals, to whom these would be mountains. In reality, most of our microscopical animalcules are of so small a magnitude, that through a lens, whose focal distance is the tenth-part of an inch, they only appear as so many points; that is, their parts cannot be distinguished, so that they appear from the vertex of that lens under an angle not exceeding a minute.

If we investigate the magnitude of such an object, it will be found nearly equal to $\frac{1}{1000000}$ th of an inch long. Supposing, therefore, these animalcules of a cubic figure, that is, of the same length, breadth, and thickness, their magnitude would be expressed by the cube of the fraction $\frac{1}{1000000}$, that is, by the number $\frac{1}{1000,000,000,000,000}$ that is, so many parts of a cubic inch, is each animalcule equal to. Leuwenhoek calculates, that a thousand millions of animalcules, which are discovered in common water, are not altogether so large as a grain of sand. In the milt of a single cod-fish, there are more animals than there are upon the whole earth; for a grain of sand is bigger than four millions of them. The white matter that sticks to the teeth also abounds with animalcules of various figures, to which vinegar is fatal; and it is known, that vinegar contains animalcules in the shape of eels. In short, according to this author, there is scarcely any thing which corrupts, without producing animalcules. Animalcules are said to be the cause of various disorders. The itch is known to be a disorder arising from the irritation of a species

of animalcules found in the pustules of the body; when the communication of it by contact from one to another is easily conceived, as also the reason of the cure being effected by cutaneous applications.

In the Philosophical Transactions, vol. 89, is a curious account of animalcules produced from an infusion of potatoes, and another of hemp-seed, by the late Mr. Ellis.

"On the 25th of May, 1768," he says, "Fahrenheit's thermometer 70°, I boiled a potato in the New-River water, till it was reduced to a mealy consistence: I put part of it, with an equal proportion of the boiling liquor, into a cylindrical glass vessel, that held something less than half a wine pint, and immediately covered it close with a glass cover. At the same time I sliced an unboiled potato, and, as near as I could judge, put the same quantity into a glass vessel of the same kind, with the same proportion of New-River water, not boiled; and, covering it with a glass cover, placed both vessels together. On the 26th of May, twenty-four hours afterwards, I examined a small drop of each by the first magnifier of Wilson's microscope, whose focal distance is reckoned $\frac{1}{30}$ th part of an inch; and, to my amazement, they were both full of animalcules, of a linear shape, very distinguishable, moving to and fro with great celerity, so that there appeared to be more particles of animal than vegetable life in each drop. This experiment I have repeatedly tried, and always found it to succeed in proportion to the heat of the circumambient air; so that even in winter, if the liquors are kept properly warm for two or three days, the experiment will succeed. I procured hemp-seed from different seedsmen, in different parts of the town; some of it I put into the New-River water, some into distilled water, and some into very hard pump-water: the result was, that in proportion to the heat of the weather, or warmth in which they were kept, there was an appearance of millions of minute animalcules in all the infusions; and, some time after, oval ones made their appearance, much larger than the first, which still continued; these wriggled to and fro in an undulatory motion, turning themselves round very quick all the time they moved forwards."

THE CHEESE-MITE.—This minute creature is a favourite subject for microscopic observations. It is covered with hairs or bristles, which resemble in their structure the awns of barley, being barbed on each side with numerous sharp-pointed processes. The mite is oviparous: from the eggs proceed the young animals, resembling the parents in all respects, except in the number of legs, which at first amount only to six, the pair from the head not making their appearance till after casting

their first skin. The eggs, in warm weather, hatch in about a week, and the young animal may be seen sometimes for a day together struggling to get rid of its egg-shell. The mite is a very voracious animal, feasting equally upon animal and vegetable substances. It is also extremely tenacious of life: for, upon the authority of Leuwenhoek, though highly discreditable to his sense of humanity, we are assured that a mite lived eleven weeks after he had glued it to a pin, in order to make his observations.

We shall close the account of the curiosities of insects with a description of THE HYDRA, or POLYPES.—In natural history, this is a genus of the *Vermes Zoophyta* class and order; an animal fixing itself by the base; linear, gelatinous, naked, contractile, and furnished with setaceous tentaculæ, or feelers; inhabiting fresh waters, and producing its deciduous offspring, or eggs, from the sides. There are five species, *H. gelatinosa*, minute and gelatinous, milk-white, cylindrical, with twelve tentaculæ shorter than the body: it inhabits Denmark, in clusters on the under side of Fuci. But on the *viridis*, the *fusca*, and the *grisca*, the greatest number of experiments have been made by naturalists, to ascertain their true nature and very wonderful habits. They are generally found in ditches. Whoever has carefully examined these, when the sun is very powerful, will find many little transparent lumps of the appearance of jelly, the size of a pea, and flatted upon one side. The same kind of substances are likewise to be met with on the under side of the leaves of plants that grow in such places. These are the polypes in a quiescent state, and apparently inanimate. They are generally fixed by one end to some solid substance, with a large opening, which is the mouth; the other having several arms fixed round it, projecting as rays from the centre. They are slender, pellucid, and capable of contracting themselves into a very small compass, or of extending to a considerable length. The arms are capable of the same contraction and expansion as the body, and with these they lay hold of minute worms and insects, bringing them to the mouth, and swallowing them. The indigestible parts are again thrown out by the mouth.

The green polype was that first discovered by M. Trembley: and the first appearances of spontaneous motion were perceived in its arms, which it can contract, expand, and twist about in various directions. On the first appearance of danger, they contract to such a degree, that they seem little longer than a grain of sand, of a fine green colour, the arms disappearing entirely. Soon afterwards, he found the *grisca*, and afterwards the *fusca*. The bodies of the *viridis* and *grisca* diminish almost insensibly from the anterior to the pos-

terior extremity; but the fusca is for the most part of an equal size, for two-thirds of its length, from the anterior to the posterior extremities, from which it becomes abruptly smaller, and then continues of a regular size to the end. These three kinds have at least six, and at most twelve or thirteen arms. They can contract themselves till their bodies do not exceed one-fourth of an inch in length, and they can stop at any intermediate degree of expansion or contraction. They are of various sizes, from an inch to an inch and a half long. Their arms are seldom longer than their bodies, though some have them an inch, and some even eight inches long. The thickness of their bodies decreases as they extend themselves, and *vice versâ*; and they may be made to contract themselves, either by agitating the water in which they are contained, or by touching the animals themselves. When taken out of the water, they all contract so much, that they appear only like a little lump of jelly. They can contract or expand one arm, or any number of arms, independently of the rest; and they can likewise bend their bodies or arms in all possible directions. They can also dilate or contract their bodies in various places, and sometimes appear thick set with folds, which, when carelessly viewed, appear like rings. Their progressive motion is performed by that power which they have of contracting and dilating their bodies. When about to move, they bend down their heads and arms; lay hold by means of them, or some other substance to which they design to fasten themselves; then they loosen their tail, and draw it towards the head; then either fix it in that place, or stretching forward their head as before, repeat the same operation. They ascend or descend at pleasure in this manner upon aquatic plants, or upon the sides of the vessel in which they are kept; they sometimes hang by the tail from the surface of the water, or sometimes by one of their arms; and they can walk with ease upon the surface of the water. On examining the tail with a microscope, a small part of it will be found to be dry above the surface of the water, and, as it were, in a little concave space, of which the tail forms the bottom; so that it seems to be suspended on the surface of the water, on the same principle that a small pin or needle is made to swim. When a polype, therefore, means to pass from the sides of the glass to the surface of the water, it has only to put that part out of the water by which it is supported, and to give it time to dry, which it always does upon these occasions; and they attach themselves so firmly by the tail to aquatic plants, stones, &c. that they cannot be easily disengaged: they often further strengthen these attachments by means of one or two of their arms, which serve as a kind of anchors for fixing them to the adjacent substances.

The fusca has the longest arms, and makes use of the most curious manœuvres to seize its prey. They are best viewed in a glass seven or eight inches deep, when their arms commonly hang down to the bottom. When this or any other kind is hungry, it spreads its arms in a kind of circle to a considerable extent, inclosing in this, as in a net, every insect which has the misfortune to come within the circumference. While the animal is contracted by seizing its prey, the arms are observed to swell like the muscles of the human body when in action. Though no appearance of eyes can be observed in the polype, they certainly have some knowledge of the approach of their prey, and shew the greatest attention to it as soon as it comes near them. It seizes a worm the moment it is touched by one of the arms, and in conveying it to the mouth, it frequently twists the arm into a spiral line like a corkscrew, by which means the insect is brought to the mouth in a much shorter time than otherwise it would be; and so soon are the insects on which the polypes feed killed by them, that M. Fontana thinks they must contain the most powerful kind of poison; for the lips scarcely touch the animal, when it expires, though there cannot be any wound perceived on it when dead. The worm, when swallowed, appears sometimes single, sometimes double, according to circumstances. When full, the polype contracts itself, hangs down as in a kind of stupor, but extends again in proportion as the food is digested, and the excrementitious part is discharged.

The manner in which the polypes propagate, is most perceptible in the grisca and fusca, as being considerably larger than the viridis. If we examine one of them in summer, when the animals are most active, and prepared for propagation, some small tubercles will be found proceeding from its sides, which constantly increase in bulk, until at last, in two or three days, they assume the figure of small polypes. When they first begin to shoot, the excrescence becomes pointed, assuming a conical figure and deeper colour than the rest of the body. In a short time it becomes truncated, and then cylindrical, after which the arms begin to shoot from the anterior end. The tail adheres to the body of the parent animal, but gradually grows smaller, until at last it hangs only by a point, and is then ready to be separated. When this is the case, both the mother and young ones fix themselves to the sides of the glass, and are separated from each other by a sudden jerk. The time requisite for the formation of the young ones is very different, according to the warmth of the weather, and the nature of the food eaten by the mother. Sometimes they are fully formed, and ready to drop off, in twenty-four hours; in other cases, when the weather is cold, fifteen days have been

requisite for bringing them to perfection. The polypes produce young ones indiscriminately from all parts of their bodies, and five or six young ones have frequently been produced at once; nay, M. Trembley has observed nine or ten produced at the same time.

When a polype is cut transversely, or longitudinally, into two or three parts, each part in a short time becomes a perfect animal; and so great is this prolific power, that a new animal will be produced, even from a small portion of the skin of the old one. If the young ones be mutilated while they grow upon the parent, the parts so cut off will be re-produced; and the same property belongs to the parent. A truncated portion will send forth young ones before it has acquired a new head and tail of its own, and sometimes the head of the young one supplies the place of that which should have grown out of the old one. If we slit a polype longitudinally through the head to the middle of the body, we shall have one formed with two heads; and by again slitting these in the same manner, we may form one with as many heads as we please. A still more surprising property of these animals is, that they may be grafted together. If the truncated portions of a polype be placed end to end, and gently pushed together, they will unite into a single one. The two portions are first joined together by a slender neck, which gradually fills up and disappears, the food passing from one part into the other; and thus we may form polypes, not only from different portions of the same animal, but from those of different animals. We may fix the head of one to the body of another, and the compound animal will grow, eat, and multiply, as if it had never been divided. By pushing the body of one into the mouth of another, so far that their heads may be brought into contact, and kept in that situation for some time, they will at last unite into one animal, only having double the usual number of arms. The hydra fusca may be turned inside out like a glove, at the same time that it continues to eat and live as before. The lining of the stomach now forms the outer skin, and the former epidermis constitutes the lining of the stomach.

CHAP. XXXIII.

CURIOSITIES RESPECTING VEGETABLES.

*Curiosities in the Vegetable Kingdom—Germination of Seeds—
Dissemination of Plants—Number of Plants upon the Earth—
Sensibility of Plants—The Sensitive Plant.*

Your contemplation further yet pursue;
The wondrous world of vegetables view!
See various trees their various fruits produce,
Some for delightful taste, and some for use.
See sprouting plants enrich the plain and wood,
For physic some, and some design'd for food.
See fragrant flow'rs, with different colours dy'd,
On smiling meads unfold their gaudy pride.

Blackmore.

CURIOSITIES IN THE VEGETABLE KINGDOM.

THE difference between animals and vegetables is so great, that at first we do not perceive any resemblance between them. Some animals only live in water; others on the earth, or in the air; and some are amphibious, or live equally well in water as upon land. And this is literally the case with vegetables: some of them only grow upon land, others in the water; some can scarcely bear any moisture, others live either in earth or water; and some even are found that exist in the air.

There is a tree in the island of Japan, which, contrary to the nature of all others, to which moisture is necessary, cannot bear the least portion. As soon as it is watered it perishes: the only way to preserve it in such a case, is to cut it off by the root, which is to be dried in the sun, and afterwards planted in a dry and sandy soil. A peculiar species of mushroom, some mosses, and other small plants, float in the air; but what is still more extraordinary, a branch of rosemary, which, as is the custom of some countries, was put in the hand of a corpse, sprouted out to the right and left so vigorously, that after a lapse of some years, the grave being opened, the face of the defunct was overshadowed with rosemary leaves. The vegetation of the truffle is still more singular: this extraordinary tubercle has neither roots, stem, leaves, flowers, nor seeds; it derives its nourishment through the pores of its bark. But it may be asked, how is it produced? why is there commonly no kind of herb in the places where this species of fungus grows? and why is the land there dry and full of crevices? These things have never been explained. No plant so much resembles animals, as that

species of membranous moss called nostoch; it is an irregular substance, of a pale green colour, and somewhat transparent; it trembles upon the slightest touch, and easily breaks. It can only be seen after rain, and is then found in many places, particularly in uncultivated soils and sandy roads. It exists in all seasons, even in winter; but is never so abundant as after rain in summer. The most remarkable circumstance about it is, its speedy growth, being formed almost instantaneously: sometimes walking in the garden in summer, not a trace of it is seen, when a sudden shower of rain falling, if the same place is visited in an hour, the walks are entirely covered with it. The nostoch was long supposed to have descended from the sky; but it is now known to be a leaf, which attracts and imbibes water with great avidity. This leaf, to which no root appears to belong, is in its natural state when impregnated with water; but a strong wind or great heat soon dissipating the water, the leaf contracts, and loses its colour and transparency: hence it appears to grow so suddenly, and to be so miraculously produced by a shower of rain; for when the rain falls upon it in its dried and imperceptible state, it becomes reanimated, and appears a fresh production.

We might readily enumerate a variety of plants that bear a resemblance to animals; but there are other peculiarities in vegetables, which solicit our attention. The whole atmosphere is pregnant with plants and invisible seeds, and even the largest grains are dispersed by the wind over the earth; and as soon as they are transported to the places where they may germinate, they become plants, and often so little soil is necessary for this purpose, that we can scarcely conceive whence they derive the necessary degree of nourishment. There are plants, and even trees, which take root and grow in the clefts of rocks, without any soil. Vegetation is sometimes very rapid; of which we have instances in mushrooms, and the common cresses, the seed of which, if put into a wet cloth, will be fit for a salad in twenty-four hours. There are plants that exist with scarcely any perceptible vitality. We often see willows, which are not only hollowed and decayed within, but their external bark is so much injured that very little of it remains; yet from these seemingly sapless trunks, buds sprout in the spring, and they are crowned with leaves and branches. How admirable, that plants should not only imbibe nutriment by their roots, but that their leaves also should assist in this important function, by inspiring air! and an inverted tree will flourish as well as when in its proper position, for the branches will grow in the earth and become roots! The advanced age that some trees attain, is also very wonderful. Some apple-trees are above a thou-

sand years old; and if we calculate the amount of the annual produce of such a tree for the above space of time, we shall find that a single pippin might supply all Europe with trees and fruit.

THE GERMINATION OF SEEDS.—Seeds are composed of different parts, according to the variety of species, the principal of which parts is the germ. Each germ has two parts: the one simple, which becomes the root; and the other laminated, which becomes the stem of the plant. The substance of most seeds is composed of two pieces, called lobes, which contain a farinaceous matter, and serve as seminal leaves to the plants. Mosses have the most simple seed, consisting only of the germ, without pellicle, and without lobes. To make seeds germinate, air, and a certain degree of heat and moisture, are necessary. The augmented heat, and the difference observable in the taste and smell, seem to denote a degree of fermentation; and the farinaceous substance becomes fitted to nourish the tender germ. It has been ascertained by experiments made with coloured fluids, that this substance imbibes a moisture, which, in conjunction with the air and heat, forms a proper nourishment till the plant has acquired strength enough to make use of the juices furnished by the root. The lobes, exhausted of their farinaceous matter, gradually dry, and fall off of themselves in a few weeks, when the plant has no further need of their assistance.—Certain herbs which grow on the mountains are of a very peculiar nature: their duration being very short, it often happens that the seed has not time to ripen; and, that the species may not be lost, the bud which contains the germ is formed upon the top of the plant, puts forth leaves, falls, and takes root. When the delicate plant shoots up from the earth, it would run too great a risk, if it were immediately exposed to the air, and to the influence of the sun. Its parts therefore remain folded close to each other, nearly the same as when in the seed. But as the root grows strong and branches out, it furnishes the superior vessels with an abundance of juice, by means of which all the organs are developed. At first the plant is nearly gelatinous; but it soon acquires more firmness, and continually increases in size.

This short account of the germination of seeds may suffice to shew, to the inquisitive in the wonders of nature, what preparations and means nature uses to produce a single plant. When, therefore, we see a seed that we have placed in the earth sprout, we shall no longer consider it as beneath our notice; but shall rather be disposed to regard it as one of those wonders of nature which have excited the observation and attention of some of the greatest of men.

Go, mark the matchless workings of that Power
 That shuts within the seed the future flower;
 Bids these in elegance of form excel;
 In colour these, and those delight the smell
 Sends nature forth, the daughter of the skies,
 To dance on earth, and charm all human eyes.

Cowper.

DISSEMINATION OF PLANTS.—When seeds are come to maturity, their dissemination is absolutely necessary, since without it no future crop would follow. The great Author of nature has wisely provided for this in various ways. The stems of many plants are long and slender, and being raised above the ground, the wind shakes them to and fro, and by this means are the ripe seeds conveyed to a distance. The seed-vessels of most plants are shut till the seeds are ripe, that so the winds may not scatter them prematurely; and when the proper season arrives, many of these open with such a degree of elasticity as to throw the seeds to a considerable distance. Other seeds have a kind of wings given them, by which they are conveyed to a distance of some miles from the parent plant. These wings consist either of a down, as in most of the composite-flowered plants, or of a membrane, as in the birch, alder, ash, elm, &c. Hence woods, which happen to be destroyed by fire, or any other accident, are soon restored again by new plants.

Some seeds are rough, or provided with a sort of hooks, by means of which they are apt to stick to animals that pass by them, and by this means are carried to the mouths of their burrows, where they meet with proper soil and manure for their growth. Berries and other pericarpiies are by nature allotted for aliment to animals; but it is on condition that they shall sow the seed while they eat it: this they do by dispersing the seeds as they are eating; and also after eating, by voiding many of them unhurt, and even in a better state for vegetation than they were before. Thus many kinds of nuts are sown; and thus did the doves of the Moluccas replant with nutmegs those islands of the East, which the sordid avarice of the Dutch had destroyed: Providence thereby frustrating, by feeble but certain means, the contemptible selfishness of that commercial people.

In this manner the woods of northern countries are sown with junipers, by the thrushes and other birds which feed upon these heavy berries. The cross-bill lives upon fir-cones, and the hawfinch upon pine-cones; by means of which the fir and the pine, of various species, are continually planted in vast abundance. In our own country, the common rook has been observed, not only to feed on acorns, but to make holes in the ground with the bill, and hide many: probably they mean only to lay in a stock for future necessity by this process;

but certain it is, that thousands of oaks are annually planted by this means. Swine, also, in searching for food, turn up the earth; and moles, by throwing up hillocks, prepare the ground for seeds of various kinds. Seas, lakes, and rivers, by their streams and currents, often convey seeds unhurt to distant countries.

In assimilating the animal and vegetable kingdoms, Linnæus denominates seeds the eggs of plants. The fecundity of plants is frequently marvellous: from a single plant or stalk of Indian Turkey wheat, are produced, in one summer, 2000 seeds; of elecampane, 3000; of sun-flower, 4000; of poppy, 32,000; of a spike of cat's-tail, 10,000 and upwards: a single fruit or seed-vessel of tobacco, contains 1000 seeds; that of white poppy, 8000. Mr. Ray relates, from experiments made by himself, that 1012 tobacco seeds are equal in weight to one grain; and that the weight of the whole quantum of seeds in a single tobacco plant, is such as must, according to the above proportion, determine their number to be 360,000. The same author estimates the annual produce of a single stalk of spleen-wort to be upwards of 1,000,000 of seeds.

PRODIGIOUS NUMBER OF PLANTS UPON THE EARTH.—It is said, that there are about 44,000 different plants already discovered, to which new ones are daily added. By means of the microscope, some have been found where they were least expected. The different varieties of mosses and sponges have been classed among vegetables, and have presented to the observation of the naturalist, seeds and flowers before unknown. Freestone is sometimes covered with brown and blackish spots; the mouldy substance which composes them adheres to various other matters, and may be considered as a little garden in vegetation. When we reflect upon the quantity of moss which covers the hardest stones, the trunks of trees, and the most barren places;—when we consider the quantity of vegetables upon the surface of the earth; the different species of flowers which delight and refresh us; the trees and bushes, add to these the aquatic plants, some of which exceed a hair in fineness;—we may be able to form some idea of the multitude of plants in the vegetable kingdom. All these species grow up, and are preserved without detriment or injury, each having that place assigned it, which is most suited to its properties. Such is the wisdom displayed in their distribution over the surface of the earth, that there is no part of it wholly destitute, and no part enjoys them in too great abundance. Some plants require the open field, where, unsheltered by trees, they may receive the sun's rays; others can only exist in water; some grow in the sand;

others in marshes and fens, which are frequently covered with water, and some bud on the surface of the earth, whilst others unfold themselves in its bosom. The different strata which compose the soil of the earth, as sand, clay, chalk, &c. favour different vegetables; and hence it is, that in the vast garden of nature nothing is absolutely sterile; from the finest sand to the flinty rock, from the torrid to the frozen zone, each soil and climate supports plants peculiar to itself. Another circumstance highly worthy of attention is: the Creator has so ordered, that, among this immense variety of plants, those which are most proper for food or medicine multiply in greater abundance than those which are of less utility. Herbs are much more numerous than trees and brambles; grass is in greater abundance than oaks; and cherry-trees more plentiful than apricots: had oaks been more frequent than grass, or trees than herbs and roots, it would have been impossible for animals to subsist.

According to the calculation of Baron Von Humboldt, 6000 plants are *agamous*, that is, plants which have no sexual organs, such as champignons, lichens, &c. Of the remainder there are found—

In Europe	7,000
In the temperate regions of Asia	1,500
In Equinoxial Asia, and the adjacent Islands	4,500
In Africa	3,000
In the temperate regions of America, in both hemispheres	4,000
In Equinoxial America	13,000
In New Holland, and the Islands of the Pacific Ocean	5,000
Total	38,000

SENSIBILITY OF PLANTS.—There are certain motions observable in plants, that make it doubtful whether they are not possessed of sensibility. Some plants shrink and contract their leaves upon being touched; others open and shut their flowers at certain fixed hours in the day, so regularly as to denote with precision the time of day; some assume a peculiar form during the night, folding up their leaves; and these different changes take place whether they are in the open air, or shut up in close apartments. Those which live under water during the time of fecundation, raise their flowers above the surface.

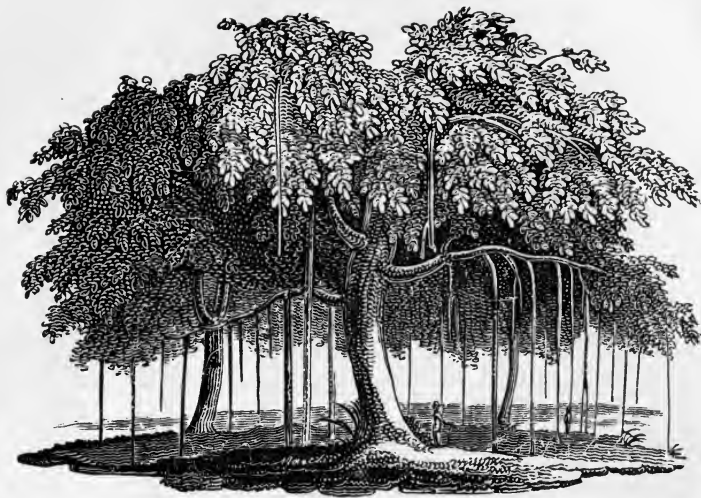
The motions of a marshy plant discovered some time since, in the province of Carolina, are still more singular. Its round leaves are furnished above, and on the sides, with a multitude of notches that are extremely irritable. When an insect happens to creep upon the superior surface of the leaves, they

fold up, and inclose the insect till it dies; the leaves then open of themselves. We may daily observe regular motions in some plants in our gardens. Tulips expand their petals when the weather is fine, and close them again at sun-set, or during rain. Vegetables with pods, such as peas and beans, open their shells when dry, and curl themselves up like shavings of wood. Wild oats, when placed upon a table, will move spontaneously, more especially if warmed in the hand. And the heliotrope, or sunflower, with various other plants, always turns towards the sun. These are incontestable facts, of the certainty of which every person may be easily convinced. From them, some conclude that we ought not to deny sensibility to be an attribute of plants; and certainly the facts which are alleged in favour of such an opinion, give it great appearance of probability. But, on the other hand, plants have no other sign of sensibility; and all that they have is entirely mechanical. We plant a shrub and destroy it, without finding any analogy between it and an animal, that we bring up and kill. We see a plant bud, blossom, and bear seed, insensibly, as the hand of a watch runs round the points of the dial. The most exact anatomy of a plant does not unfold to us any organ which has the least relation to those of animal sensibility. When we oppose these observations to those from which we might infer the sensibility of plants, we remain in uncertainty, and we cannot explain the phenomena related above. Our knowledge upon this subject is very imperfect, and is confined to simple conjecture. We neither attribute sensibility to plants, nor deny it to them, with certainty.

THE SENSITIVE PLANT.—This singular plant rises from a slender woody stalk seven or eight feet in height, armed with short recurved thorns; the leaves grow upon long footstalks, which are prickly, each sustaining two pair of wings; from the place where these are inserted, come out small branches, having three or four globular heads of pale purplish flowers coming out from the side, on short peduncles; the principal stalk has many of those heads of flowers on the upper part, for more than a foot in length; this, as also the branches, is terminated by like heads of flowers; the leaves move but slowly when touched, but the footstalks fall, when they are pressed pretty hard. It is a native of Brazil, (*M. pudica*, humble plant,) having the roots composed of many hairy fibres, which mat slowly together; from these come out several woody stalks, declining towards the ground, unless supported; they are armed with short recurved spines, having winged or pinnate leaves; flowers from the axils, on short peduncles, collected in small globular heads, of a yellow colour.

“ Naturalists (says Dr. Darwin) have not explained the immediate cause of the collapsing of the sensitive plant; the leaves meet and close in the night, during the sleep of the plant, or when exposed to much cold in the day-time, in the same manner as when they are affected by external violence, folding their upper surfaces together, and in part over each other like scales or tiles, so as to expose as little of the upper surface as may be to the air, but do not, indeed, collapse quite so far; for when touched in the night during their sleep, they fall still further, especially when touched on the foot-stalks between the stems and the leaflets, which seem to be their most sensitive or irritable part. Now, as their situation after being exposed to external violence resembles their sleep, but with a greater degree of collapsion, may it not be owing to a numbness or paralysis consequent to too violent irritation, like the pantings of animals from pain or fatigue? A sensitive plant being kept in a dark room till some hours after day-break, its leaves and leaf-stalks were collapsed as in its most profound sleep, and on exposing it to the light, above twenty minutes passed before the plant was thoroughly awake, and had quite expanded itself. During this night the upper surfaces of the leaves were oppressed; this would seem to shew that the office of this surface of the leaf was to expose the fluids of the plant to the light, as well as to the air.” Dr. Darwin has thus characterized these plants.—

Weak with nice sense the chaste Mimosa stands,
From each rude touch withdraws her timid hands
Oft as light clouds o'erpass the summer glade,
Alarm'd, she trembles at the moving shade;
And feels alive through all her tender form,
The whisper'd murmurs of the gathering storm;
Shuts her sweet eyelids to approaching night,
And hails with freshen'd charms the rising light.



THE BANNIAN TREE.



CEDAR OF LEBANON.

CHAP. XXXIV.

CURIOSITIES RESPECTING VEGETABLES.—(*Continued.*)

The Cocoa-Nut Tree—The Bread-Fruit Tree—The Bannian Tree—Fountain Trees—The Tallow Tree—The Paper Tree—The Calabash Tree—Remarkable Oak—Dimensions, &c. of some of the largest Trees now growing in England—Upas, or Poison Tree.

Admiration, feeding at the eye,
And still unsated, dwells upon the theme.

Cowper.

THE COCOA-NUT TREE.

OF all the gifts which Providence has bestowed on the Oriental world, the cocoa-nut tree most deserves our notice: in this single production of nature, what blessings are conveyed to man! It grows a stately column, from thirty to fifty feet in height, crowned by a verdant capital of waving branches, covered with long spiral leaves; under this foliage, branches of blossoms, clusters of green fruit, and others arrived at maturity, appear in mingled beauty. The trunk, though porous, furnishes beams and rafters for our habitations; and the leaves, when platted together, make an excellent thatch, common umbrellas, coarse mats for the floor, and brooms; while their finest fibres are woven into very beautiful mats for the rich. The covering of the young fruit is extremely curious, resembling a piece of thick cloth, in a conical form, close and firm as it came from the loom; it expands after the fruit has burst through its inclosure, and then appears of a coarser texture. The nuts contain a delicious milk, and a kernel sweet as the almond: this, when dried, affords abundance of oil; and when that is expressed, the remains feed cattle and poultry, and make good manure. The shell of the nut furnishes cups, ladles, and other domestic utensils, while the husk which incloses it is of the utmost importance; it is manufactured into ropes and cordage of every kind, from the smallest twine to the largest cable, which are far more durable than those of hemp. In the Nicobar islands, the natives build their vessels, make the sails and cordage, supply them with provisions and necessaries, and provide a cargo of arrack, vinegar, oil, gagpree or coarse sugar, cocoa-nuts, coir, cordage, black paint, and several inferior articles, for foreign markets, entirely from this tree.

Many of the trees are not permitted to bear fruit; but the embryo bud, from which the blossoms and nuts would spring

is tied up, to prevent its expansion; and a small incision being then made at the end, there oozes in gentle drops a cool pleasant liquor, called Trace, or Toddy, the palm wine of the poets. This, when first drawn, is cooling and salutary; but when fermented and distilled, produces an intoxicating spirit. Thus, a plantation of cocoa-nut trees yields the proprietor considerable profits, and generally forms part of the government revenue.

THE BREAD-FRUIT TREE.—The systematic name of this plant is *Artocarpus*, which is merely the English name translated into Greek. There are several species; particularly *A. incisa*, and *A. integrifolia*.

The genuine bread-fruit tree is the *artocarpus incisa*. In captain Cook's Voyage, it is observed, that the bread-fruit tree is about the size of a middling oak; its leaves are frequently a foot and a half long, oblong, deeply sinuated, like those of the fig-tree, which they resemble in consistence and colour, and in exuding a milky juice when broken. The fruit is the size and shape of a child's head, and the surface is reticulated, not much unlike a truffle; it is covered with a thin skin, and has a core about as big as the handle of a small knife; the eatable part lies between the skin and core; it is as white as snow, and of the consistence of new bread. It must be roasted before it is eaten, being first divided into three or four parts; its taste is insipid, with a slight sweetness, somewhat resembling that of the crumb of wheaten bread, mixed with Jerusalem artichoke. The fruit not being in season all the year, there is a method of supplying this defect, by reducing it to sour paste, called *make*; and besides this, cocoa-nuts, bananas, plantains, and a great variety of other fruits, come in aid of it. This tree not only supplies food, but also clothing, for the bark is stripped off, the suckers, and formed into a kind of cloth. To procure the fruit for food costs the Otaheiteans no trouble or labour, but climbing a tree. This most useful tree is distributed very extensively over the East Indian continent and islands, as well as the innumerable islands of the South Seas. In Otaheite, however, and some others, the evident superiority of the seedless variety for food has caused the other to be neglected, and it is consequently almost worn out. We are informed by Captain King, that in the Sandwich islands these trees are planted, and flourish with great luxuriance on rising grounds; that they are not, indeed, in such abundance, but that they produce double the quantity of fruit to those growing on the rich plains of Otaheite; that the trees are nearly of the same height, but that the branches begin to strike out from the trunk much lower, and with greater

luxuriance; and that the climate of these islands differs very little from that of the West Indian islands, which lie in the same latitude. This reflection probably first suggested the idea of conveying this valuable tree to our islands in the West Indies. For this purpose his Majesty's ship the *Bounty* sailed for the South Seas, on the 23d of December, 1787, under the command of Lieutenant William Bligh. But a fatal mutiny prevented the accomplishment of this benevolent design. His Majesty, however, not discouraged by the unfortunate event of the voyage, and fully impressed with the importance of securing so useful an article of food as the bread-fruit to our West Indian Islands, determined, in the year 1791, to employ another ship, for a second expedition on this service; and, in order to secure the success of the voyage as much as possible, it was thought proper that two vessels should proceed together on this important business. Accordingly, a ship of 400 tons, named the *Providence*, was engaged for the purpose, and the command of her given to Captain Bligh; and a small tender, called the *Assistant*, commanded by Lieut. Nathaniel Portlock. Sir Joseph Banks, as in the former voyage, directed the equipment of the ship for this particular purpose. Two skilful gardeners were appointed to superintend the trees and plants, from their transplantation at Otaheite, to their delivery at Jamaica; and Captain Bligh set sail on the 2d of August, 1791. The number of plants taken on board at Otaheite, was 2634, in 1281 pots, tubs, and cases; and of these 1151 were bread-fruit trees. When they arrived at Coupang, 200 plants were dead, but the rest were in good order. Here they procured ninety-two pots of the fruits of that country. They arrived at St. Helena, with 830 fine bread-fruit trees, besides other plants. Here they left some of them, with different fruits of Otaheite and Timor, besides mountain rice and other seeds; and hence the East Indies may be supplied with them.

On their arrival at St. Vincent's, they had 551 cases, containing 678 bread-fruit trees, besides a great number of other fruits and plants, to the number of 1245. Near half this cargo was deposited here under the care of Mr. Alexander Anderson, the superintendant of his Majesty's botanic garden, for the use of the Windward islands; and the remainder, intended for the Leeward islands, was conveyed to Jamaica, and distributed as the governor and council of Jamaica were pleased to direct. The exact number of bread-fruit trees brought to Jamaica, was 352; out of which, five only were reserved for the botanic garden at Kew. Captain Bligh had the satisfaction, before he quitted Jamaica, of seeing the trees, which he had brought with so much success, in a most flourishing state; insomuch that no doubt remained of their growing well, and speedily

producing fruit: an opinion which subsequent reports have confirmed.

The bread-fruit, when perfectly ripe, is pulpy, sweetish, putrescent, and in this state is thought to be too laxative; but when green it is farinaceous, and esteemed a very wholesome food, either baked under the coals, or roasted over them. The taste is not unlike that of wheaten bread, but with some resemblance to that of Jerusalem artichokes or potatoes. It was mentioned before, that a sort of cloth was made of the inner bark: to this we may add, that the wood is used in building boats and houses; the male catkins serve for tinder: the leaves for wrapping their food in, and for wiping their hands instead of towels; and the juice for making bird-lime, and as a cement for filling up the cracks of their vessels, and for holding water. Three trees are supposed to yield sufficient nourishment for one person.

THE BANNIAN TREE.—The bannian, or Indian fig-tree, is a native of several parts of the East Indies, and has a woody stem, branching to a great height and vast extent. It is universally considered as one of the most beautiful of nature's productions; and, contrary to most other things in animal and vegetable nature, appears exempted from decay. Every branch from the main body throws out its own roots, at first in small tender fibres, several yards from the ground, but which thicken considerably before they reach the surface, and then, striking in, they increase to large trunks, and become parent trees, shooting out new branches from the top; these in time suspend their roots, which, swelling into trunks, produce other branches, thus continuing in a progressive state as long as the earth, the common parent of them all, continues her sustenance. The Hindoos are peculiarly fond of the bannian tree; they regard it as an emblem of the Deity, from its long duration and overshadowing beneficence, and almost pay it divine honours. Near this tree their most esteemed pagodas are generally erected; and under their shade the Brahmins spend their days in religious solitude, wandering among the cool recesses and beautiful walks of this umbrageous canopy, impervious to the hottest beams of a tropical sun.

A remarkably fine tree of this kind grows on an island in the river Narbedda, in the province of Guzerat. It is distinguished from others of the same species by the name of Cub-beer Bur, which was given it in honour of a famous saint. It was once much larger than it is at present, high and violent floods having carried away the banks of the island on which it grew, and with them such parts of the tree as have thus far extended its roots. What remains, is two thousand feet in circumference; measured round the principal stems; the over-

hanging branches, which have not yet struck down, cover a much larger space. The chief trunks of this single tree, each of which in size exceeds our English oaks or elms, amount to 350, the smaller stems to more than 3000, all casting out new branches and hanging roots, to form in time parent trunks. Cubbeer Bur is famed through India for its amazing extent and beauty. The Indian armies frequently encamp around it, and at stated periods solemn festivals are held under its branches, where thousands of votaries repair from various parts of the empire. It is even said that 7000 persons found ample room under its shade. The English gentlemen sometimes form elegant and extensive encampments, where they spend whole weeks together under this delightful pavilion, which is inhabited by green wood-pigeons, doves, and peacocks, and also a variety of feathered songsters; families of monkeys are also in every quarter playing their antic tricks; and bats, to the astonishing size of six feet, from the extremity of one wing to that of the other. This tree not only shelters, but affords sustenance to these numerous inhabitants, being covered, amidst its bright leaves, with small figs of a rich scarlet, on which they regale.

FOUNTAIN TREES.—These are very extraordinary vegetables, growing in one of the Canary Islands, and likewise said to exist in some other places, which distil water from their leaves in such plenty, as to answer all the purposes of the inhabitants who live near them. Of these trees we have the following account, in Glasse's History of the Canary Islands. "There are three fountains of water in the whole island of Hiero, wherein the fountain tree grows. The larger cattle are watered at those fountains, and at a place where water distils from the leaves of a tree. Many writers have made mention of this famous tree, some in such a manner as to make it appear miraculous: others again deny the existence of any such tree; among whom is Father Feyjoo, a modern Spanish author. But he, and those who agree with him in this matter, are as much mistaken as those who would make it appear to be miraculous. The author of the History of the Discovery and Conquest, has given us a particular account of it, which I shall here relate at large.—

"The district in which this tree stands is called Tigulabe; near to which, and in the cliff or steep rocky ascent that surrounds the whole island, is a gutter or gully, which commences at the sea, and continues to the summit of the cliff, where it joins or coincides with a valley, which is terminated by the steep front of a rock. On the top of this rock grows a tree, called, in the language of the ancient inhabitants, *garse*, sacred or holy tree, which for many years has been preserved

sound, entire, and fresh. Its leaves constantly distill such a quantity of water as is sufficient to furnish drink to every living creature in Hiero, nature having provided this remedy for the drought of the island. It is situated about a league and a half from the sea. Nobody knows of what species it is, only that it is called *til*. It is distinct from other trees, and stands by itself. The circumference of the trunk is about twelve spans, the diameter four, and in height, from the ground to the top of the highest branch, forty spans: the circumference of all the branches together is 120 feet. The branches are thick and extended, the lowest commence about the height of an ell from the ground. Its fruit resembles the acorn, and tastes something like the kernel of a pine-apple, but is softer and more aromatic. The leaves of this tree resemble those of the laurel, but are larger, wider, and more curved; they come forth in a perpetual succession, so that the tree always remains green. Near to it grows a thorn, which fastens on many of its branches, and interweaves with them; and at a small distance from the garse are some beech-trees, bresoes, and thorns. On the north side of the trunk are two large tanks or cisterns, of rough stone, or rather one cistern divided, each half being twenty feet square, and sixteen spans in depth. One of these contains water for the drinking of the inhabitants; and the other, that which they use for their cattle, washing, and such like purposes.

“Every morning, near this part of the island, a cloud or mist arises from the sea, which the south or easterly winds force against the forementioned steep cliff; so that the cloud, having no vent but by the gutter, gradually ascends it, and from thence advances slowly to the extremity of the valley, where it is stopped and checked by the front of the rock which terminates the valley; and then rests upon the thick leaves and wide spreading branches of the tree, from whence it distils in drops during the remainder of the day, until it is at length exhausted, in the same manner that we see water drip from the leaves of trees after a heavy shower of rain.

“This distillation is not peculiar to the garse or *til*, for the bresoes, which grow near it, likewise drop water; but their leaves being but few and narrow, the quantity is so trifling, that, though the natives save some of it, yet they make little or no account of any but what distils from the *til*; which, together with the water of some fountains, and what is saved in the winter season, is sufficient to serve them and their flocks. A person lives on the spot near which this tree grows, to take care of it and its waters; and is allowed a house to live in, with a certain salary. He every day distributes to each family of the district, seven pots or vessels full of water, besides what he gives to the principal people of the island.”

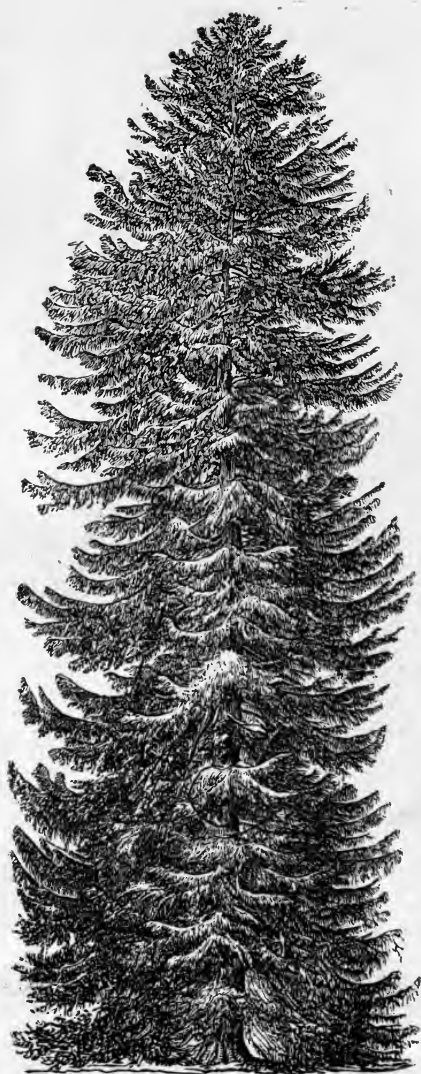
Whether the tree which yields water at this present time, be the same as that mentioned in the above description, I cannot determine: but it is probable there has been a succession of them; for Pliny, describing the Fortunate Island, says, "In the mountains of Ombrion, are trees resembling the plant *ferula*, from which water may be procured by pressure. What comes from the black kind is bitter, but that which the white yields is sweet and potable." Trees yielding water are not peculiar to the island of Hiero; for travellers inform us of one of the same kind on the island of St. Thomas, in the bight or gulf of Guinea. In Cockburn's Voyages, we find the following account of a dropping tree, near the mountains of Fera Paz, in America.—

"On the morning of the fourth day, we came out on a large plain, where were great numbers of fine deer; and in the middle stood a tree of unusual size, spreading its branches over a vast compass of ground. Curiosity led us up to it. We had perceived, at some distance, the ground about it to be wet; at which we began to be somewhat surprised, as well knowing there had no rain fallen for nearly six months past, according to the certain course of the season in that latitude: that it was impossible to be occasioned by the fall of dew on the tree, we were convinced, by the sun's having power to exhale away all moisture of that nature a few minutes after its rising. At last, to our great amazement, as well as joy, we saw water dropping, or as it were distilling, fast from the end of every leaf of this wonderful, (nor had it been amiss if I had said miraculous tree;) at least it was so with respect to us, who had been labouring four days through extreme heat, without receiving the least moisture, and were now almost expiring for the want of it. We could not help looking on this as liquor sent from heaven, to comfort us under great extremity. We caught what we could of it in our hands, and drank very plentifully of it; and liked it so well, that we could hardly prevail with ourselves to give over. A matter of this nature could not but incite us to make the strictest observations concerning it; and accordingly we staid under the tree near three hours, and found we could not fathom its body in five times. We observed the soil where it grew to be very strong; and upon the nicest inquiry we could afterwards make, both of the natives of the country and the Spanish inhabitants, we could not learn there was any such tree known throughout New Spain, nor perhaps all America over: but I do not relate this as a prodigy in nature, because I am not philosopher enough to ascribe any natural cause for it; the learned may perhaps give substantial reasons in nature, for what appeared to us a great and marvellous secret, and far beyond our power to account for."

THE TALLOW TREE.—This is a remarkable tree, growing in great plenty in China; so called from its producing a substance like tallow, and which serves for the same purpose: it is about the height of a cherry-tree; its leaves in form of a heart, of a deep shining red colour, and its bark very smooth. Its fruit is inclosed in a kind of pod, or cover, like a chesnut, and consists of three round white grains, of the size and form of a small nut, each having its peculiar capsule, and a little stone within. This stone is encompassed with a white pulp, which has all the properties of true tallow, both as to consistence, colour, and even smell, and accordingly the Chinese make their candles of it; which would doubtless be as good as those in Europe, if they knew how to purify their vegetable, as well as we do our animal tallow. All the preparation they give it, is to melt it down, and mix a little oil with it, to make it softer and more pliant. It is true, the candles made of it yield a thicker smoke and a dimmer light than ours; but those defects are owing in a great measure to the wicks, which are not of cotton, but only a little rod of dry light wood, covered with the pith of a rush wound round it; which, being very porous, serves to filtrate the minute parts of the tallow, attracted by the burning stick, and by this means is kept alive.

THE PAPER TREE.—The name of this tree is *Aouta*. It is a mulberry-tree, found at Otaheite, in the South Sea, from which a cloth is manufactured, that is worn by the principal inhabitants. The bark of the trees is stripped off, and deposited to soak in running water; when it is sufficiently softened, the fibres of the inner coat are carefully separated from the rest of the bark; they are then placed in lengths of about eleven or twelve yards, one by the side of another, till they are about a foot broad; and two or three layers are put one upon another. This is done in the evening; and next morning the water is drained off, and the several fibres adhere together in one piece. It is afterwards beaten on a smooth piece of wood with instruments marked lengthways, with small grooves of different degrees of fineness; and by means of this it becomes as thin as muslin. After bleaching it in the air, to whiten it, it is fit for use.

Another article worthy of the reader's attention, is the **ADANSONIA, ETHIOPIAN SOUR GOURD, MONKEYS' BREAD, or AFRICAN CALABASH TREE.**—There is but one known species belonging to this genus, the *baobal*, which is perhaps the largest production of the whole vegetable kingdom. It is a native of Africa. The trunk is not above twelve or fifteen feet high, but from sixty to seventy feet round. The lowest



NORWAY SPRUCE FIR.



THE PEAK CAVERN, DERBYSHIRE.

branches extend almost horizontally, and as they are about sixty feet in length, their own weight bends their extremities to the ground, and thus form an hemispherical mass of verdure of about 120 or 130 feet diameter. The roots extend as far as the branches: that in the middle forms a pivot, which penetrates a great way into the earth; the rest spread near the surface. The flowers are in proportion to the size of the tree, and are followed by an oblong pointed fruit, ten inches long, five or six broad, and covered with a kind of greenish down, under which is a ligneous rind, hard, and almost black, marked with rays, which divide it lengthwise into sides. It is very common in Senegal, and the Cape de Verd islands; and is found 100 leagues up the country, at Gulam, and upon the sea-coast as far as Sierra Leone.

The age of this tree is no less remarkable than its enormous size. Mr. Adanson relates, that, in a botanical excursion to the Magdalen Islands, he discovered some calabash-trees, from five to six feet diameter, on the bark of which were engraved, or cut to a considerable depth, a number of European names. Two of these names, which he was at the trouble to repair, were dated, one in the fourteenth, the other in the fifteenth century. The inscribed trees, mentioned by this ingenious Frenchman, had been seen in 1555, almost two centuries, by Thevet, who mentions them in his relation of voyage to Terra Antarctica, or Australis. Adanson saw them in 1749. The virtues and uses of this tree and its fruits are various. The negroes of Senegal dry the bark and leaves in the shaded air, and then reduce them to powder, which is of a pretty good green colour. This powder they preserve in bags of linen or cotton, and call it *lillo*. They use it every day, putting three or four pinches of it into a mess, whatever it happens to be, as we do pepper and salt: but their view is, not to give a relish to their food, but to preserve a perpetual and plentiful perspiration, and to attemper the too great heat of the blood; purposes to which it certainly answers, as several Europeans have proved by repeated experiments; preserving themselves from the epidemic fever, which, in that country, is as fatal to them as the plague, and generally rages during the months of September and October: when the rains have suddenly ceased, the sun exhales the water left by them on the ground, and fills the air with a noxious vapour. M. Adanson, in the critical season, made a light ptisan of the leaves of the baobab, which he had gathered in the August of the preceding year, and had dried in the shade; and drank constantly about a pint of it every morning, either before or after breakfast, and the same quantity of it every evening, after the heat of the sun began to abate: he also took the same quantity in the middle of the

day, but this was only when he felt some symptoms of an approaching fever. By this precaution he preserved himself, during the five years he resided at Senegal, from the diarrhæa and fever, which are so fatal there, and which are, however, the only diseases of the place; while other officers suffered very severely, only one of them excepted, upon whom M. Adanson prevailed to use this remedy, which for its simplicity was despised by the rest. This ptisan alone prevents that heat of urine which is common in these parts, from the month of July to November, provided the person abstains from wine. The fruit is not less useful than the leaves and the bark. The pulp that envelopes the seeds has an agreeable acid taste, and is eaten for pleasure: it is also dried and powdered, and used medicinally in pestilential fevers, the dysentery, and bloody flux: the dose is a drachm, passed through a fine sieve, taken either in common water, or in an infusion of the plantain. This powder is brought into Europe under the name of *terra sigillata Lemnia*. The woody bark of the fruit, and the fruit itself, when spoiled, help to supply the negroes with an excellent soap, which they make by drawing a lie from the ashes, and boiling it with palm-oil that begins to be rancid. The trunks of such of these trees as are decayed, the negroes hollow out into burying places for their poets, musicians, and buffoons. Persons of these characters they esteem greatly while they live, supposing them to derive their superior talents from sorcery, or a commerce with demons: but they regard their bodies with horror when dead, and will not give them burial in the usual manner, neither suffering them to be put into the ground, nor thrown into the sea or any river, because they imagine that the water would not then nourish the fish, nor the earth produce its fruits. The bodies shut up in these trunks become dry without rotting, and form a kind of mummies without the help of embalming. The baobal is very distinct from the calabash-tree of America, with which it has been confounded by Father Labat.

The following is an account of a **REMARKABLE OAK TREE**:—

Behold the oak does young and verdant stand
 Above the grove, all others to command;
 His wide-extended limbs the forest crown'd,
 Shading the trees, as well as they the ground:
 Young murmur'ing tempests in his boughs are bred,
 And gathering clouds from round his lofty head;
 Outrageous thunder, stormy winds, and rain,
 Discharge their fury on his head in vain;
 Earthquakes below, and lightnings from above,
 Reul not his trunk, nor his fix'd root remove.

Blackmore.

Mr. Gilpin, in his forest scenery, gives the following account of an aged oak :—

“Close by the gate of the Water-walk, at Magdalen College in Oxford, grew an oak, which perhaps stood there a sapling when Alfred the Great founded the university. This period only includes a space of nine hundred years, which is no great age for an oak. It is a difficult matter indeed to ascertain the age of a tree. The age of a castle or abbey is the object of history: even a common house is recorded by the family that built it. All these objects arrive at maturity in their youth, if I may so speak. But the tree gradually completing its growth, is not worth recording in the early part of its existence: it is then only a common tree; and afterwards, when it becomes remarkable for its age, all memory of its youth is lost. This tree, however, can almost produce historical evidence for the age assigned to it.”

About five hundred years after the time of Alfred, William of Wainfleet, Dr. Stukely tells us, expressly ordered this college to be founded near the great oak; (*Itiner. Curios.*) and an oak could not, I think, be less than five hundred years of age, to merit that title, together with the honour of fixing the site of a college. When the magnificence of Cardinal Wolsey erected that handsome tower which is so ornamental to the whole building, this tree might probably be in the meridian of its glory; or rather, perhaps it had attained a green old age. But it must have been manifestly in its decline, at that memorable æra, when the tyranny of James gave the fellows of Magdalen so noble an opportunity of withstanding bigotry and superstition. It was afterwards much injured in the time of Charles II, when the present walks were laid out: its roots were disturbed; and from that period it declined fast, and became reduced by degrees to little more than a mere trunk. The oldest members of the university can scarcely recollect it in better plight: but the faithful records of history* have handed down its ancient dimensions.

It once flung its boughs through a space of sixteen yards on every side from its trunk; and under its magnificent pavilion could have sheltered with ease three thousand men: though in its decayed state, it could, for many years, do little more than shelter some luckless individual, whom the driving shower had overtaken in his evening walk. In the summer of the year 1788, this magnificent ruin fell to the ground, alarming the college with its crashing sound. It then appeared how precariously it had stood for many years. Its grand tap-root was decayed; and it had hold of the earth only by two or three roots, of which none was more than a couple of inches in diameter. From a part of its ruins, a chair has been made

* See Dr. Plot's Hist. of Oxf. ch. vi. sect. 45

for the president of the college, which will long continue its memory.

This will be a proper place for introducing the history of **SOME OF THE LARGEST TREES NOW GROWING IN ENGLAND.**—In Hainault Forest, near Barking in Essex, there is an oak which has attained the enormous bulk of thirty-six feet in circumference. This extraordinary tree has been known for ages by the name of Fairlop. The tradition of the country traces it half way up the Christian æra. Beneath its shade, which overspreads an area of three hundred feet in circuit, an annual fair has long been held on the first Friday in July, and no booth is suffered to be erected beyond the extent of its boughs.

At Cromwell Park, near Letbury in Gloucestershire, the seat of Lord Dacre, is a huge chesnut tree, probably as remarkable for antiquity as size; having been mentioned (according to Sir Richard Atkins) in king John's days, six centuries ago, as the wonder of the neighbourhood, and measuring at present, at the foot, fifty-seven feet in circumference. It is supposed to be at least eight hundred years old.

In Darley church-yard, near Matlock in Derbyshire, is a yew tree, thirty-three feet in girt.

In the church-yard of Aldworth, in Berkshire, is a yew tree, the trunk of which, four feet from the ground, measures nine yards in circumference. It is of considerable height: all recollection of its age is lost.

THE SHELTON OAK.—About a mile and a half from Shrewsbury, where the Pool road diverges from that which leads to Oswestry, there stands an ancient decayed oak. There is a tradition, that Owen Glendwr (Glynder) ascended this tree to reconnoitre; and finding that the king was in great force, and that the Earl of Northumberland had not joined his son Hotspur, he fell back to Oswestry, and immediately after the battle of Shrewsbury, retreated precipitately to Wales. This tree is now in a complete state of decay, and hollow, even in the larger ramifications. The following are the dimensions of the Shelton Oak:—

	ft.	in.
Girt, at bottom, close to the ground	44	3
Ditto, 5 feet from ditto	25	1
Ditto, 8 feet from ditto	27	0
Height of the tree	41	6

Vide Gent. Mag. vol. lxxx. p. 305.

THE BOWTHORPE OAK, situate in the park between Bourne and Stamford—

“On a fine eminence, of slow ascent,
The landscape round stretch'd to a vast extent,”

—is the property of Philip Duncombe Pouncefort, Esq. The trunk is thirty-nine feet six inches in circumference. The inside of the body is hollow, and the lower part of it was formerly used as a feeding place for calves, the upper, as a pigeon-house. The late possessor, George Pouncefort, Esq (in whose family it has been for many centuries,) in 1768 had it floored, with benches placed round, and a door of entrance: frequently twelve persons have dined in it with ease.

“————— crowds yearly flock to see
In leafy pomp the celebrated tree;
Charm'd to contemplate Nature's giant son,
Fed by the genial seasons as they run.”

No tradition is to be found respecting it, it having, ever since the memory of the oldest inhabitants, or their ancestors, been in the same state of decay.

We conclude this chapter with an essay on the UPAS, or POISON-TREE OF JAVA; by Thomas Horsfield, M. D.—From the Seventh Volume of the Transactions of the Literary and Philosophical Society of Java.

The literary and scientific world has in few instances been more grossly and impudently imposed upon, than by the account of the Bohan Upas, published in Holland about the year 1780. The history and origin of this celebrated forgery still remains a mystery. Foersch, who put his name to the publication, certainly was (according to the information I have received from credible persons, who have long resided on the island,) a surgeon in the Dutch East India Company's service, about the time the account of the Upas appeared. It would be in some degree interesting to become acquainted with his character. I have been led to suppose that his literary abilities were as mean, as his contempt of truth was consummate.

Having hastily picked up some vague information concerning the Upas, he carried it to Europe, where his notes were arranged, doubtlessly by a different hand, in such a form as, by their plausibility and appearance of truth, to be generally credited.

But though the account just mentioned, in so far as relates to the situation of the Poison Tree, to its effects on the surrounding country, and to the application said to have been made of the Upas on criminals in different parts of the island, as well as the description of the poisonous substance itself, and its mode of collection, has been demonstrated to be an extravagant forgery,—the existence of a tree in Java, from whose sap a poison is prepared, equal in fatality, when thrown into the circulation, to the strongest animal poisons hitherto known, is a

fact, which it is at present my object to establish and to illustrate.

The tree which produces this poison, is called Antshar, and grows in the eastern extremity of the island.

The Antshar is one of the largest trees in the forests of Java. The stem is cylindrical, perpendicular, and rises completely naked to the height of sixty, seventy, or eighty feet. Near the surface of the ground it spreads obliquely, dividing into numerous broad appendages or wings, much like the *Canarium commune*, and several others of our large forest trees. It is covered with a whitish bark, slightly bursting in longitudinal furrows. Near the ground this bark is, in old trees, more than half an inch thick; and, upon being wounded, it yields plentifully the milky juice from which the celebrated poison is prepared. A puncture or incision being made in the tree, the juice or sap appears oozing out, of a yellowish colour, somewhat frothy; from old trees, paler; and nearly white from young ones: when exposed to the air, its surface becomes brown. The consistence very much resembles milk, only it is thicker and viscid. This sap is contained in the true bark, or cortex, which, when punctured, yields a considerable quantity, so that in a short time a cupful may be collected from a large tree. The inner bark, or liber, is of a close fibrous texture, like that of the *Morus papyrifera*, and when separated from the other bark, and cleansed from the adhering particles, resembles a coarse piece of linen. It has been worked into ropes, which are very strong, and the poorer class of people employ the inner bark of younger trees, which is more easily prepared, for the purpose of making a coarse stuff, which they wear when working in the fields. But it requires much bruising, washing, and a long immersion in water, before it can be used; and even when it appears completely purified, persons wearing this dress, on being exposed to the rain, are affected with an intolerable itching, which renders their flimsy covering almost insupportable.

It will appear, from the account of the manner in which the poison is prepared, that the deleterious quality exists in the gum, a small portion of which still adhering to the bark, produces, when it becomes wet, this irritating effect; and it is singular, that this property of the prepared bark is known to the Javanese, in all places where the tree grows, (for instance, in various parts of the provinces of Bangil and Malang, and even at Onarang,) while the preparation of a poison from its juice, which produces a mortal effect when introduced into the body by pointed weapons, is an exclusive art of the inhabitants of the eastern extremity of the island.

One of the regents in the eastern districts informed me, that having many years ago prepared caps or bonnets from

the inner bark of the Antshar, which were stiffened in the usual manner with thick rice-water, and handsomely painted, for the purpose of decorating his mantries, they all decidedly refused to wear them, asserting that they would cause their hair to fall off.

I first met with the Antshar in the province of Poegar, on my way to Bangoowangee : in the province of Blambangan, I visited four or five different trees, from which this description has been made, while two of them furnished the juice for the preparation of the upas. The largest of these trees had, where the oblique appendages of the stem entered the ground, a diameter of at least ten feet; and where the regularly round and straight stem began, a distance of at least ten feet from the points of the two opposite appendages at the surface of the ground, its diameter was full three feet. I have since found a very tall tree in Passooroowang, near the boundary of Malang, and very lately I have discovered several young trees in the forests of Japara, and one tree in the vicinity of Onarang. In all these places, though the inhabitants are unacquainted with the preparation and effect of the poison, they distinguish the tree by the name of Antshar. From the tree I found in the province of Passooroowang, I collected some juice, which was nearly equal in its operation to that of Blambangan. One of the experiments to be related below, was made with the upas prepared by myself, after my return to the chief village. I had some difficulty in inducing the inhabitants to assist me in collecting the juice, as they feared a cutaneous eruption and inflammation, resembling, according to the account they gave of it, that produced by the *Ingas* of this island, the *Rhus vernix* of Japan, and the *Rhus radicans* of North America; but they were only affected by a slight heat and itching of the eyes. In clearing the new grounds in the environs of Bangoowangee for cultivation, it is with much difficulty the inhabitants can be made to approach the tree, as they dread the cutaneous eruption which it is known to produce when newly cut down.

But except when the tree is largely wounded, or when it is felled, by which a large portion of the juice is disengaged, the effluvia of which, mixing with the atmosphere, affects the persons exposed to it with the symptoms just mentioned, the tree may be approached and ascended like the other trees in the forests.

The Antshar, like trees in its neighbourhood, is on all sides surrounded by shrubs and plants; in no instance have I observed the ground naked or barren in its immediate circumference.

The largest tree I met with in Blambangan, was so closely environed by the common trees and shrubs of the forest in

which it grew, that it was with difficulty I could approach it. Several vines and climbing shrubs, in complete health and vigour, adhered to it, and ascended to nearly half its height. And at the time I visited the tree and collected the juice, I was forcibly struck with the egregious misrepresentation of Foersch. Several young trees, spontaneously sprung from seeds that had fallen from the parent, reminded me of a line in Darwin's Botanic Garden,

"Chained at his root two scion demons dwell ;"

while in recalling his beautiful description of the Upas, my vicinity to the tree gave me reason to rejoice that it is founded on fiction. The wood of the Antshar is white, light, and of a spongy appearance.



CHAP. XXXV.

CURIOSITIES RESPECTING VEGETABLES.—(Continued.)

Curious Plant near the Cape of Good Hope—The Mandrake—Changeable Flower—Chinese Method of Preparing Tea—Antiquity of Sugar—Curious Effects of Cinchona, or Peruvian Bark—Curious Particulars of a Pound Weight of Cotton-wool—Animated Stalk—Animal Flower.

"Soft roll your incense, herbs, and fruits, and flowers,
In mingled clouds to Him, whose sun exalts,
Whose breath perfumes you, and whose pencil paints."

CURIOUS PLANT NEAR THE CAPE OF GOOD HOPE.

The following account of a curious plant is taken from Thunberg's Travels :—

"The fruit of a species of *Mesembryan Thermum*, (says the writer,) was sometimes brought to the tavern as a rarity, and was called *Rosa de Jericho*. When it is put into water, it gradually opens all its seed-vessels, and exactly resembles a sun; and when it becomes dry again, it contracts itself, and closes by degrees. This is a no less necessary than singular property, which points out the admirable institution of an all-wise Creator; inasmuch as this plant, which is found in the most arid plains, keeps its seeds fast locked up in time of drought, but when the rainy season comes, and the seeds can grow, it opens its receptacles, and lets fall the seeds, in order that they may be dispersed abroad. The water in which this fruit has lain, is sometimes given to women that are near their time, and is thought to procure them an easy delivery."

THE MANDRAKE.—This plant possesses a long taper root resembling the parsnip, running three or four feet into the ground; immediately from the crown of the root arises a circle of leaves, at first standing erect, but when grown to the full size, they spread open and lie upon the ground; these leaves are more than a foot in length, and about five inches broad in the middle, of a dark green colour, and a fetid scent; among these come out the flowers, each on a scape three inches in length; they are five-cornered, of an herbaceous white colour, spreading open at top like a primrose, having five hairy stamens, and a globular germ supporting an awl-shaped style, which becomes a globular soft berry, when full-grown as large as a nutmeg, of a yellowish green colour, and when ripe, full of pulp.

Many singular facts are related of this plant, among which we select the following: the roots have been supposed to bear a resemblance to the human form, and are figured as such in the old herbals, being distinguished into the male with a long beard, and the female with a prolix head of hair. Mountebanks carry about fictitious images, shaped from roots of bryony and other plants, cut into form, or forced to grow through moulds of earthenware, as mandrake-roots. It was fabled to grow under a gallows, where the matter falling from the dead body, gave it the shape of a man; to utter a great shriek, or terrible groans, at the digging up: and it was asserted, that he who would take up a plant of mandrake, should in common prudence tie a dog to it for that purpose, for, if a man should do it himself, he would surely die soon after. To this curious vegetable the poet alludes in the following lines:—

“Mark how that rooted mandrake wears
His human feet, his human hands;
Oft as his shapely form he rears,
Aghast the frightened ploughman stands.”

THE CHANGEABLE FLOWER.—“On the island of Lewchew, (says Mr. M'Leod,) is found a remarkable production, about the size of a cherry-tree, bearing flowers, which, alternately on the same day, assume the tint of the rose or lily, as they are exposed to sunshine or the shade. The bark of this tree is of a dark green, and the flowers bear a resemblance to our common roses. Some of our party, whose powers of vision were strong, (assisted by a vigorous imagination,) fancied that, by attentive watching, the change of hue, from white to red, under the influence of the solar ray, was actually perceptible to the eye: that, however, they altered their colour in the course of a few hours, was very obvious.”

As this is a chapter devoted to miscellaneous articles of this class, it may not be amiss to insert **THE CHINESE METHOD OF PREPARING TEA**.—Tea grows on a small shrub, the leaves of which are collected twice or thrice every year. Those who collect the leaves three times a year, begin at the new moon which precedes the vernal equinox, whether it falls at the end of February or the beginning of March. At that period most of the leaves are perfectly green, and hardly fully expanded: but these small and tender leaves are accounted the best of all; they are scarce, and exceedingly dear.

The second crop, or the first with those who collect the leaves only twice a year, is gathered about the end of March or beginning of April. Part of the leaves have then attained to maturity; and though the rest have acquired only half their size, they are both collected without any distinction.

The third (or second with some) and last crop, is more abundant, and is collected about the end of April, when the leaves have attained their full growth, both of size and number. Some people neglect the two first crops, and confine themselves entirely to this, the leaves of which are selected with great care, and distributed into classes, according to their size or goodness.—Tea ought to be rejected as of a bad quality, when old, and withered leaves are found amongst it, which may be easily known by infusing a little of it in water, for then the leaves dilate, and return to their natural state.

The leaves of the tea shrub are oblong, sharp-pointed, indented on the edges, and of a very beautiful green colour. The flower is composed of five white petals, disposed in the form of a rose, and is succeeded by a pod, of the size of a filbert, containing two or three small green seeds, which are wrinkled, and have a disagreeable taste. Its root is fibrous, and spreads itself out near the surface of the ground.

This shrub grows equally well in a rich, as in a poor soil. It is to be found all over China, but there are certain places where the tea is of a better quality than in others. Some people give the preference to the tea of Japan, but we have reason to doubt whether there is any real difference.

The manner of preparing tea is very simple. When the leaves are collected, they are exposed to the steam of boiling water, in order to soften them; and they are then spread out upon metal plates, and placed over a moderate fire, where they acquire that shrivelled appearance which they have when brought to Europe.

In China, there are only two kinds of the tea shrub; but the Chinese, by their industry, have considerably multiplied each of them. If there are, therefore, large quantities of tea in that country which are excessively dear, there is some

also very common, and sold at a low rate. The Chinese, however, are very fond of good tea, and take as much pains to procure it of an excellent quality, as the Europeans do to procure excellent wine.

Bohea Tea.—The Chinese name of this tea is *you-y-tcha*, that is to say, tea of the third kind, called *you-y*. It takes its name from a mountain in the province of Fokien. There are three kinds of this tea: the first of which, called common Bohea, grows at the bottom of the mountain; the second, called *cong fou*, or *camphou*, grows at the top; and the third, named *saot-chaon*, grows in the middle. These names in England are corrupted into *congo*, and *souchong*.

Bohea teas in general ought to be dry, and heavy in the hand: this is a sign that the leaves have been full and juicy. When infused, they ought to communicate to the water a yellow colour, inclining a little to green, which indicates that they are fresh, for old tea produces a red colour. Care must be taken above all to avoid red leaves, and to choose such as are large and entire. This is also a sign of freshness; for the longer tea is kept, the more it is shaken, which breaks the leaves, and mixes them with a great deal of dust. It sometimes happens, however, that the tea-dust is owing to the manner in which it is put into the box, as the Chinese tread upon it with their feet, to make the box hold a large quantity. The leaves of the *cong-fou* and *saot-chaon* ought to have a beautiful black shining tint, and to communicate to water a very bright yellow and a mild taste.

The Pekoe is a particular kind of tea-shrub, the leaves of which are all black on the one side, and all white on the other. As the real Pekoe tea is very scarce and dear, the Chinese adulterate it, by mixing with it some of the small half-grown leaves, as yet white, which grow on the top of the common Bohea tea. This changes the quality of the Pekoe, for these leaves being scarcely formed, can have very little sap or flavour.

Green Teas.—Green teas do not grow in the same place as the Bohea tea. They are brought from the province of Nankin, and are distinguished into three sorts. The first is known under the name of *songlo tea*, but oftener under that of green toukay; the second is called *bing tea*; and the third *hayssuen tea*, or hyson. There are also some other kinds, but the greater part of them are unknown, or of little importance to foreigners.

The songlo and hayssuen teas come from the same shrub; their only difference is in the manner of their being prepared. Bing tea grows on a different shrub, the leaves of which are thicker and larger than those of other kinds. All teas ought to have a green leaden tint: the older they are, the leaves become

more yellow, which is a very great fault. They ought also to have a burnt or scorched smell, not too strong, but agreeable; for when they have been long kept, they have a filthy smell, somewhat like that of pilchards. The French wish to find in green teas, and particularly in songlo and imperial, an odour similar to that of soap. In these several kinds of tea, there is a particular distinction to be made, as they are generally classed into one, two, or three kinds, according to the periods at which they were gathered.

ANTIQUITY OF SUGAR.—From the few remains of the Grecian and Roman authors which have survived the ravages of time, we can find no proof that the juice of the sugar-cane was known at a very early period. There can be no doubt, however, that in those countries where it was indigenous, its value was not long concealed. It is not improbable that it was known to the ancient Jews; for there is some reason to suppose, that the Hebrew word, which occurs frequently in the Old Testament, and which is by our translators rendered sometimes *calamus*, and sometimes *sweet-cane*, does in fact mean the sugar-cane. The sugar-cane was first made known to the western parts of the world, by the conquest of Alexander the Great. Strabo relates, that Nearchus's admiral found it in the East Indies, A. C. 325. It is evidently alluded to in a fragment of Theophrastus, preserved in Photius. Varro, who lived A. C. 68. describes it in a fragment quoted by Isidorus, as a fluid pressed from reeds of a large size, which was sweeter than honey. Dioscorides, about A. C. 35, says, "that there is a kind of honey called *saccharon*, which is found in India and Arabia Felix. It has the appearance of salt, and is brittle when chewed. If dissolved in water, it is beneficial to the bowels and stomach, is useful in diseases of the bladder and kidneys, and, when sprinkled on the eye, removes those substances that obscure the sight." This is the first account we have of its medicinal qualities. Galen often prescribed it as a medicine. Lucan relates, that an Oriental nation in alliance with Pompey used the juice of the cane as a common drink. Pliny says it was produced in Arabia and India, but that the best came from the latter country. It is also mentioned by Arrian, in his *Petipulus* of the Red Sea, by the name of Σαχαρ (*sachar*) as an article of commerce from India to the Red Sea. Ælian, Tertullian, and Alexander Aphrodisæus, mention it as a species of *honey* procured from canes.

CURIOUS EFFECTS OF CINCHONA, OR PERUVIAN BARK.—An account has been published in the *Journal de Pharmacie*, for May 1819, of some curious effects produced by Peruvian

Bark. A French merchant, M. Delpéch, residing at Guayra, in the Caraccas, had stored up a large quantity of fresh cinchona, in apartments which were afterwards required for the reception of some travellers as guests. These apartments contained each eight or ten thousand pounds of bark; and in consequence of its fermentation, the heat was much greater here than in the other parts of the house, rendering the place somewhat disagreeable. One of the beds placed in these rooms, was occupied by a traveller, ill of a malignant fever: after the first day he found himself much better, though he had taken no medicine; in a few days he felt himself quite recovered, without any medical treatment whatsoever. This unexpected success induced M. Delpéch to make some other trials: several persons ill of fever, were placed successively in his magazine of cinchona, and they were all speedily cured, simply by the effluvia of the bark.

It happened that a bale of coffee, and some common French brandy, were kept in the same place for some months: one of the brandy bottles happened to be uncorked, and, on examination, was found to possess a slight aromatic taste, to be more tonic, and very superior to common brandy. The coffee was also much altered; when roasted, it was more bitter than common coffee, and left in the mouth a taste similar to that of an infusion of bark.

It is to be observed, that the bark which produced all these effects was fresh; and the question whether that of commerce would produce the same effects can only be answered by experiment.

CURIOUS PARTICULARS OF A POUND WEIGHT OF COTTON-WOOL.—The wool came from the East Indies to London; from London it went to Manchester, where it was manufactured into yarn; from Manchester it was sent to Paisley, where it was woven; it was then sent to Ayrshire, where it was tambered; it came back to Paisley, and was there veined; afterwards it was sent to Dumbarton, where it was hand-sewed, and again brought to Paisley, whence it was sent to Renfrew to be bleached; and was returned to Paisley, whence it went to Glasgow and was finished; and from Glasgow was sent per coach to London. The time taken to bring this article to market was three years, from the time it was packed in India, till the time it arrived in cloth at the merchant's warehouse in London; when it must have been conveyed 5000 miles by sea, and 920 by land, and contributed to support no less than 150 people, by which the value had been increased 2000 per cent.—Thus, from materials of little value in their native state, do arts and manufactures administer to individual comfort and national revenue.

We shall close this chapter with an account of two curious articles, not strictly vegetable, denominated the animated stalk, and the animal flower.

THE ANIMATED STALK.—This very remarkable animal was found by Mr. Ives, at Cuddalore, and he mentions several kinds of it: some appearing like dry straws tied together, others like grass; some have bodies much larger than others, with the addition of two scaly imperfect wings; their neck is no bigger than a pin, but twice as long as their body; their heads are like those of a hare, and their eyes vertical and very brisk. They live upon flies, and catch these insects very dexterously with the two fore feet, which they keep doubled up in three parts, close to their head, and dart out very quick on the approach of their prey; and when they have caught it, they eat it very voraciously, holding it in the same manner as a squirrel does its food. On the outer joints of the fore feet are several very sharp hooks, for the easier catching and holding of their prey; while, with the other feet, which are four in number, they take hold of trees, or any other thing, the better to surprise whatever they lie in wait for. They drink like a horse, putting their mouths into the water. Their excrements, which are very white, are almost as large as the body of the animal, and, as the natives say, dangerous to the eyes.

THE ANIMAL FLOWER.—Animal flower, in zoology, is a name given to several species of animals belonging to the genus of *Actinia* of Linnæus. They have likewise been distinguished by the names of *Urtica marina*, or *Sea-nettle*, and *Sea-anemone*, from their claws or tentacles being disposed in regular circles, and tinged with a variety of bright lively colours, resembling the petals of some of our most beautiful flowers. As to one species particularly, mentioned by Abbé Diequemarre, in the *Phil. Trans.* for 1773, article 37, the purest white, carmine, and ultramarine, are said to be scarcely sufficient to express their brilliancy. The bodies of some of them are hemispherical, of others cylindrical, and others are shaped like a fig. Their substance likewise differs: some are stiff and gelatinous, others fleshy and muscular; but all of them are capable of altering their figure, when they extend their bodies and claws in search of food. They are found in many of the rocky coasts of the West India Islands, and likewise on some parts of the coast of England. They have only one opening, which is the centre of the uppermost part of the animal; round this are placed rows of fleshy claws; this opening is the mouth of the animal, and is capable of great extension. The animals themselves, though exceedingly voracious, will bear long fasting. They may be preserved alive a whole

year, or perhaps longer, in a vessel of sea water, without any visible food; but, when food is presented, one of them will successively devour two muscles in their shells, or even swallow a whole crab as large as a hen's egg. In a day or two the crab-shell is voided at the mouth, perfectly cleared of all the meat. The muscle-shells are likewise discharged whole, with the two shells joined together, but entirely empty, so that not the least particle of fish is to be perceived on opening them. An anemone of one species, will even swallow an individual of another species; but, after retaining it ten or twelve hours, will throw it up alive and uninjured. Through this opening also, it produces its young ones alive, already furnished with little claws, which, as soon as they fix themselves, they begin to extend in search of food.

In Hughes's Natural History of Barbadoes, an account is also given of several species of animal flowers. They are described as only found in a bason in one particular cave; and of the most remarkable species mentioned by him, we have the following description:—"In the middle of the bason, there is a fixed stone or rock, which is always under water. Round its sides, at different depths, seldom exceeding eighteen inches, are seen at all times of the year, issuing out of little holes, certain substances that have the appearance of fine radiated flowers, of a pale yellow or a bright straw colour, slightly tinged with green, having a circular border of thick-set petals, about the size of, and much resembling those of a single garden marigold, except that this seeming flower is narrower at the discus, or setting on of the leaves, than any flower of that kind. I have attempted to pluck one of these from the rock, to which they are always fixed, but never could effect it; for as soon as my fingers came within two or three inches of it, it would immediately contract close together its yellow border, and shrink back into the hole of the rock; but, if left undisturbed for about four minutes, it would come gradually in sight, expanding, though at first very cautiously, its seeming leaves, till at last it appeared in its former bloom. However, it would again recoil with a surprising quickness, when my hand came within a small distance of it. Having tried the same experiment by attempting to touch it with my cane, and a small slender rod, the effect was the same. Though I could not by any means contrive to take or pluck from the rock one of these animals entire, yet I once cut off (with a knife, which I had held for a long time out of sight, near the mouth of a hole out of which one of these animals appeared) two of these seeming leaves. These, when out of the water, retained their shape and colour, but, being composed of a membrane-like substance surprisingly thin, it soon shrivelled up and decayed."

The Abbé Diequemarre, by many curious, though cruel experiments, related in the *Phil. Trans.* for 1773, has shewn, that these animals possess, in a most extraordinary degree, the power of reproduction, so that scarce any thing more is necessary to produce as many sea anemones as we please, than to cut a single one into as many pieces. A sea anemone being cut in two by a section through the body, that part where the limbs and mouth are placed, ate a piece of a muscle, offered to it soon after the operation, and continued to feed and grow daily for three months after. The food sometimes passed through the animal, but was generally thrown up again, considerably changed, as in the perfect sea anemone. In about two months, two rows of limbs were perceived growing out of the part where the incision was made. On offering food to this new mouth, it was laid hold of, eaten, and, the limbs continually increasing, the animal gradually became as perfect as those which had never been cut. In some instances, however, he found that when one of these creatures was cut through, new limbs would be produced from the cut place, those at the mouth remaining as before; so that a monstrous animal was the consequence, having two mouths, and feeding at both ends.

Having put some of them into a pan of water, set over a slow fire, he found that they lost their life at fifty degrees of Reaumur's thermometer. To avoid the imputation of cruelty in these experiments, the author argues the favourable consequences that have attended his operations on the sea anemones, which have been so fortunate as to fall into his hands: as he has not only multiplied their existence, but also renewed their youth, "which last," he adds, "is surely no small advantage." The reproductive power of the Barbadoes animal flower is prodigious. Many people coming to see these strange creatures, and occasioning some inconvenience to a person through whose grounds they were obliged to pass, he resolved to destroy the objects of their curiosity; and, that he might do so effectually, he caused all the holes out of which they appeared, to be carefully bored and drilled with an iron instrument, so that we cannot suppose but their bodies must have been entirely crushed to a pulp: nevertheless, they again appeared in a few weeks, from the very same places.

Animal flowers are found in as great beauty and variety on the coast of Galloway, as any where in the West Indies. They are repeatedly taken notice of in Sir J. Sinclair's *Statistical Account of Scotland*. Mr. Little, minister of Colvend, mentions the polypus, or sea anemone, among the productions of that coast. Mr. Muirhead, minister of Urr, gives the following particular description of them:—"About five years ago, I discovered in the parish of Colvend, the animal flower, in

as great perfection and variety as it is in Jamaica. The lively colours, and the various and elegant forms of the polypus on this coast, are truly equal to any thing related by natural historians, respecting the sea-flowers of any other country. To see a flower of purple, of green, blue, yellow, &c. striving to catch a worm, is really amusing." And Mr. Marshall, minister of Brittle, has allotted a section of his Statistical Account of his parish, to animal flowers; wherein he says, "Till of late perhaps it has not been much adverted to, that the animal flower, or water polypus, is even common along the shores of Brittle, Colvend, and very likely round the whole coast of the stewartry of Galloway. The form of these polypi is elegant, and pleasantly diversified. Some are found resembling the sunflower, some the hundred-leaved rose, but the greater number bear the likeness of the poppy. The colours differ as much as the form. Sometimes the animal flower is of a deep purple, frequently of a rose colour, but mostly of a light red or fleshy hue. The most beautiful of them, that could be picked up, have often been carried from the shore of Colvend, twelve or fifteen miles up into the country, where they have lived, fed on worms, and even bred for several weeks, and might have existed much longer, if they could have been supplied with sea-water."



CHAP. XXXVI.

CURIOSITIES RESPECTING VEGETABLES.—(*Concluded.*)

If to this lower planet we advert,
 Seat of our birth and nurture, proofs abound
 Of infinite contrivance, matchless skill.
 Whether the site or figure we regard,
 Or distribution of the various parts
 Perfective of the system, strokes appear
 Too exquisite for bungling chance to hit.

Bally.

FUNGUS, OR MUSHROOM.

By fungus, we mean the mushroom tribe. The ancients called them *the children of the earth*, to indicate the obscurity of their origin. The moderns have likewise been at a loss in what rank to place them; some referring them to the animal, some to the vegetable, and others to the mineral kingdom. Messrs. Wilck and Minchausen, have not scrupled to rank these bodies among animal productions; because, when fragments of them or their seeds were macerated in water, these gentlemen perceived a quantity of animalcules discharged, which they supposed capable of being changed into the same

substance. It was an ancient opinion, that *beef could produce bees*; but it was reserved for Messrs. Wilck and Minchausen, to suppose that *bees could produce beef*. The former asserts, that fungi consist of innumerable cavities, each inhabited by a polype; and he does not hesitate to ascribe the formation of them to their inhabitants, in the same way as it has been said that the coral, the lichen, and the mucor, were formed. Hedwig has lately shewn how ill-founded this opinion is with respect to the lichen; and M. Durande has demonstrated its falsity with regard to the corallines.

“Indeed, (says M. Bonnet, speaking of the animality of fungi,) nothing but the rage for paradox could induce any one to publish such a fable; and I regret that posterity will be able to reproach our times with it. Observation and experiment should enable us to overcome the prejudices of modern philosophy, now that those of the ancient have disappeared and are forgotten.” It cannot be denied, that the mushroom is one of the most perishable of all plants, and it is therefore the most favourable for the generation of insects. Considering the quickness of its growth, it must be furnished with the power of copious absorption; the extremity of its vessels must be more dilated than in other plants. Its root seems, in many cases, to be merely intended for its support; for some species grow upon stones, or moveable sand, from which it is impossible they can draw much nourishment. We must therefore suppose, that it is chiefly by the stalk that they absorb. These stalks grow in a moist and tainted air, in which float multitudes of eggs, so small, that the very insects they produce are with difficulty seen by the microscope. These eggs may be compared to the particles of the byssus, 100,000 of which, as M. Gleditsch says, are not equal to one-fourth of a grain.

May we not suppose that a quantity of such eggs are absorbed by the vessels of the fungus, and that they remain there without any change, till the plant begins to decay? Besides, the eggs may be only deposited on the surface of the plant, or they may exist in water, into which they are thrown for examination. Do not we see that such eggs, dispersed through the air, are hatched in vinegar, in paste, &c. and wherever they find a convenient nidus for their development? Can it be surprising, then, that the corruption of the mushroom should make the water capable of disclosing certain beings that are really foreign to both? It is not more easy to acquiesce in the opinions of those naturalists who place the fungi in the mineral kingdom, because they are found growing on porous stones, thence called *lapides fungarii*; which, however, must be covered with a little earth, and be watered with tepid water, in order to favour the growth. Such mush-

rooms are no more the produce of the stone, than the lichen is of the rock to which it adheres, or the moss, of the tree on which it is found.

We have only to observe the growth of mushrooms, to be convinced that this happens by development, and not by addition or combination of parts, as in minerals. The opinion of Boccone, who attributed them to an unctuous matter performing the function of seed, and acquiring extension by apposition of similar parts; and that of Morison, who conceived that they grew spontaneously out of the earth by a certain mixture of salt and sulphur, joined with oils from the dung of quadrupeds; have now no longer any adherents. Fungi are produced, they live, they grow by development; they are exposed to those vicissitudes natural to the different periods of life which characterize living substances; they perish and die; they extract, from the extremity of their vessels, the juices with which they are nourished; they elaborate and assimilate them to their own substance: they are, therefore, organized and living beings, and consequently belong to the vegetable kingdom.

But whether they are real plants, or only the production of plants, is still a matter in dispute with the ablest naturalists. Some ancient authors have pretended to discover the seed of mushrooms; but the opinion was never generally received. Petronius, when he is laughing at the ridiculous magnificence of his hero Trimalcio, relates, that he had written to the Indies for the seed of morelle. These productions were generally attributed to the superfluous humidity of rotten wood, or other putrid substances. The opinion took its rise from observing that they grew most copiously in rainy weather. Such was the opinion of Trajus, king of Bauhin, and even of Columna, who, talking of the *peziza*, says, that its substance was more solid and harder, because it did not originate from rotten wood, but from the pituita of the earth. It is not surprising, that, in times when the want of experiment and observation made people believe that insects could be generated by putrefaction, we should find the opinion general, that fungi owed their origin to the putrescence of bodies, or to a viscous humour analogous to putridity. Malpighi could not satisfy himself as to the existence of seeds, which other botanists have pretended to discover. He only says, that these plants must have them, or that they perpetuate themselves, and shoot by fragments. Micheli, among the moderns, appears to have employed himself most successfully on this subject. He imagined, that he not only saw the seeds, but even the stamina, as well as the little transparent bodies destined to favour the dissemination and fecundation of these seeds. Before this author, Lister thought he per-

ceived seeds in the *Fungus perosus crassus magnus* of John Bauhin: the little round bodies that are found in the pezizæ and belvellæ, at that time, passed for seeds; which did not appear at all probable to Marsigli, considering that the eye, when assisted with the very best microscopes, could perceive nothing similar in much larger fungi. Indeed, these bodies may be the capsules or covers of the seeds, if they are not the seeds themselves. However this may be, Marsigli, observing that fungi were often without roots or branches, and that they wanted flowers and seeds, the means which nature employs for the production of perfect plants, thought himself warranted in doubting whether these beings could be ranked in the number of vegetables. The doubts of Marsigli prompted him to observe the formation of fungi. Their matrix he called *situs*: he imagined they grew in places where they met with an unctuous matter, composed of oil mixed with nitrous salt, which, by fermentation, produced heat and moisture, and insinuated itself between the fibres of wood; that is, he imagined them the production of a viscous and putrescent humour. Lancisi, in like manner, considered fungi as owing their existence to the putrefaction of vegetables, and supposed them a disease in the plants; but he imagined "that the fibres of the trees were necessary to their production," as is the case in the formation of galls; and compared them to the warts and other excrescences of the human body. He added, that such fungous vegetable tumors must necessarily assume various forms and figures, from the fluids which distend the tubes and vessels relaxed by putrescence, from the ductility of the fibres and their direction, and from the action of the air. This opinion has been refuted by the celebrated naturalist M. de Jussieu, in the Memoirs of the Academy of Sciences for 1728. He maintains, that the fungi have a great analogy with the lichen, which is allowed to be a vegetable; that, like the lichen, they are divested of stalks, branches, and leaves; that, like it, they grow and are nourished upon the trunks of trees, on pieces of rotten wood, and on all sorts of putrid vegetables; that they resemble the lichen too in the rapidity of their growth, and the facility with which many of them may be dried, and restored to their former figure upon being immersed in water; and lastly, that there is a great similarity in the manner in which their seeds are produced. He affirms, that only the warts and excrescences which grow on animal bodies, and the knots and other tumors that are to be found on trees, can be compared with each other; for they are composed equally of the solid and liquid substance of the plant or animal on which they grow; whereas, the matter of the fungi is not only quite distinct from that of the plants on which they are found, but often entirely similar

to the substance of those that spring immediately from the earth.

The organization (says M. de Jussieu) which distinguishes plants and other productions of nature, is visible in the fungi, and the particular organization of each species is constant at all times, and in all places; a circumstance which could not happen, if there were not an animal reproduction of species, and consequently a multiplication and propagation by seed. This is not, he says, an imaginary supposition, for the seeds may be felt like meal upon mushrooms with gills, especially when they begin to decay; they may be seen with a magnifying glass, in those that have gills with black margins: and, lastly, says he, botanists can have no doubt that fungi are a distinct class of plants; because, by comparing the observations made in different countries, with the figures and descriptions of such as have been engraved, the same genera and the same species are every where found.

Notwithstanding this refutation by M. de Jussieu, another naturalist, M. de Necker, has lately maintained, in his *Mycitologia*, That the fungi ought to be excluded from the three kingdoms of nature, and be considered as intermediate beings. He has observed, like Marsigli, the matrix of the fungi; and has substituted the word *carchte* (initium faciens) instead of *situs*; imagining that the rudiment of the fungus cannot exist beyond that point in which the development of the filaments of fibrous roots is perceived. He allows, that fungi are nourished and grow like vegetables; but he thinks that they differ very much from them in respect of their origin, structure, nutrition, and rapidity of growth. He says, that the various vessels which compose the organization of vegetables, are not to be found in the fungi, and that they seem entirely composed of cellular substance and bark; so that this simple organization is nothing more than an aggregation of vessels endowed with a common nature, that suck up the moisture in the manner of a sponge; with this difference, that the moisture is assimilated into a part of the fungus, and not merely imbibed for nutrition.

Lastly, That the fructification, the only essential part of a vegetable, and which distinguishes it from all other organized bodies, being wanting, fungi cannot be considered as plants. This, he thinks, is confirmed by the constant observation of those people who gather the morelle and the mushroom, and who never find them in the same spots where they had formerly grown. As the generation of fungi (says M. Necker) is always performed when the parenchymatous cellular substance has changed its nature, form, and function, we must conclude that it is the degeneration of that part which produces these bodies.

But if fungi were owing merely to the degeneration of plants, they would be still better entitled to constitute a new kingdom. They would then be a decomposition, not a new formation, or new bodies. Besides, we cannot deny, that in those bodies which form the limit between the animal and vegetable kingdoms, the organization becomes simple, as the organs destined for nutrition are multiplied; but, as the last in the class of insects belongs to the animal kingdom, fungi ought, notwithstanding the simplicity of their organization, still to belong to the vegetable kingdom.

The parenchymatous, or cellular substance, which, as M. Bonnet says, is universally extended, embraces the whole fibrous system, and becomes the principal instrument of growth, must naturally be more abundant in those productions; and this accounts for the rapidity of their enlargement. Besides, growth, whether slow or rapid, never was employed to determine the presence or absence of the vegetable or animal character. The *draba verma*, which, in a few weeks, shoots, and puts forth its leaves, flowers, and fruit, is not less a plant than the palm. The insect that exists but for a day, is as much an animal, as the elephant that lives for centuries. As to the seeds of the fungi, it is probable that nature meant to withdraw from our eyes the dissemination of these plants, by making the seeds almost imperceptible; and it is likewise probable, that naturalists have seen nothing but their capsules. Since, however, from the imperfection of our senses, we are unable to perceive these seeds, because those bodies which have been called their seeds, and the fragments or cuttings of the plants themselves, have not produced others of the same species; Nature seems to have reserved for herself the care of disseminating certain plants: it is in vain, for instance, that the botanist sows the dust found in the capsules of the orchis, though every one allows it to be the seed.

But, after all, what are those parts in the fungi casually observed by naturalists, and which they have taken for the parts of fructification? These are quite distinct from the other parts; and whatever may be their use, they cannot have been formed by the prolongation of the cellular substance, or of the fibres of the tree on which the fungus grows: they are, therefore, owing, like flower and fruit, to the proper organization of the plant. The plants, however, have a particular existence, independent of their putrefying nidus. The gills of certain fungi, which differ essentially from the rest of the plant in their conformation, would be sufficient to authorize this latter opinion. But can putrefaction create an organic substance? Nature undoubtedly disseminates through the air, and over the surface of the earth, innumerable seeds of fungi, as well as eggs of insects. The plant and the animal

are excluded, when the nidus, in which they are deposited, or the temperature, is favourable for their development. No fortuitous concurrence, either of atoms or fluids, could produce bodies so exquisitely and so regularly organized. It is sufficient, to throw one's eye on the beautiful plates which Schœffer has published of them, and compare them, by the glass, with the warts and other excrescences of animals, to be convinced that they have not the same origin. The function of the cellular substance in vegetables must be greatly superior to that in animals, if it could produce any thing but deformities. The greater part of fungi exhibit a configuration much too regular, constant, and uniform, to be the effect of chance or putrefaction. As this form is preserved the same in all places where fungi have been found, it follows, that they contain in themselves the principles of reproduction. They resemble the misletoe, and other parasitic plants, which are perfectly distinct from the trees on which they grow. The fungi, therefore, are organized and living substances,—or true plants.

CHAP. XXXVII.

CURIOSITIES RESPECTING STONES.

The Meteoric Stone—Labrador Stone—Asbestos—Mushroom Stone—The Changeable Stone—A Wonderful Diamond—A Singular Curiosity.

There are more things in heaven and earth
Than are dreamt of in our philosophy.

Shakspeare.

THE METEORIC STONE.

THE following description of a meteoric stone, which fell in the year 1511, is taken from a set of observations on natural history, meteorology, &c. made in the early part of the sixteenth century, by Andrea da Prato, of Milan. These have not been published; but various copies of them exist. They have been commented upon by Dr. Louis Rossi, in the *Giornale di Fisica, Chémica, &c.* from whence this description is taken.—“On the 4th of September, 1511, at the second hour of the night, and also at the seventh, there appeared in the air, at Milan, a running fire, with such splendour, that the day seemed to have returned; and some persons beheld the appearance of a large head, which caused great wonder and fear in the city. The same thing happened on the following night at the ninth hour. A few days after, beyond the river Adela, there fell from heaven many stones,

which being collected at Cremasco (Crema), were found to weigh eight, and even eleven pounds each. Their colour was similar to that of burnt stones."—Dr. Bossi considers this as an authentic description of the fall of an *aërolite*.

THE LABRADOR STONE, is a curious species of Feld-spar, or Rhombic Quartz, which exhibits all the colours of a peacock's tail. It was discovered some years ago by the Moravians, who have a colony among the Esquimaux, in Labrador. It is found of a light or deep gray colour, but for the most part of a blackish gray. When held in the light in various positions, it discovers a diversity of colours, such as the blue of lapis lazuli, grass-green, apple-green, pea-green, and sometimes, but more seldom, a citron yellow. Sometimes it has a colour between that of red copper and tornbuck-gray; at other times the colours are between gray and violet. For the most part, these colours are in spots, but sometimes in stripes on the same piece. The stones are found in pretty large angular pieces, appear foliated when broken, and the fragments are of a rhomboidal figure.

We shall next introduce **THE ASBESTOS**.—This is a stone found in several places in Europe and Asia, and particularly in Sweden, Corsica, Cornwall, and the island of Anglesea in Wales. It is of a silky nature, very fine, and of a grayish colour; insipid, and indissoluble in water. It may be split into threads and filaments, from one to ten inches in length. It is indestructible by fire; whence it may be employed for many useful purposes. There are some sorts whose filaments are rigid and brittle, and others more flexible. The former cannot be spun into cloth, and the latter with difficulty. In consequence of its incombustibility, it was very much valued by the ancients for wrapping up the bodies of the dead. In the year 1702, an urn was discovered at Rome, with the bones of a human body wrapped in a cloth made of flexible asbestos. The method of preparing it is as follows: the stone is laid to soak in warm water, then opened and divided by the hands, that the earthy matter may be washed out. This earth is white like chalk, and makes the water thick and milky. This being several times repeated, the filaments are afterwards collected and dried: they are commodiously spun with flax. When the cloth is woven, it is best preserved by oil from breaking. It is then put into the fire; and the flax being burnt out, the cloth remains pure and white. It might also be made into paper; and, from its incombustibility, wills, or any other thing of importance, could be written on it. The Chinese make furnaces of this mineral, which are very portable.

THE MUSHROOM STONE, or stone capable of producing mushrooms.—In the *Ephemerides* of the Curious mention is made, of a stone, so called by Dr. J. G. Wolckamerus, who saw one in Italy, which never ceases to produce, in a few days, mushrooms of an excellent flavour, by the most simple and easy process imaginable. “It is (says he) of the bigness of an ox’s head, rough and uneven on its surface, and on which are also perceived some clefts and crevices. It is black in some parts, and in others of a lighter and grayish colour. Internally it is porous, and nearly of the nature of pumice stone, but much heavier; and it contains a small piece of flint, which is so incorporated with it as to appear to have been formed at the same time the stone itself received its form. This gives room to judge, that these stones have been produced by a fat and viscid juice, which has the property of indurating whatever matter it filtrates into. The stone, when lightly covered with earth, and sprinkled with warm water, produces mushrooms of an exquisite flavour, which are usually round, sometimes oval, and whose borders, by their inflections and different curvities, represent in some measure human ears. The principal colour of these mushrooms is sometimes yellowish, and sometimes of a bright purple, but they are always diversified with spots of a deep orange colour, or reddish brown; and when these spots are recent, and still in full bloom, they produce a very agreeable effect to the sight. But what appears admirable is, that the part of the stalk which remains adhering to the stone when the mushroom has been separated from it, grows gradually hard, and petrifies in time; so that it seems that this fungus restores to the stone the nutritive juice it received from it, and that it thus contributes to its increase.” John Baptist Porta says, that this stone is found in several parts of Italy; and that it is not only to be met with at Naples, taken out of mount Vesuvius, but also on mount Pantherico, in the principality of Arellino; on mount Garganus, in Apulia; and on the summit of some other high mountains. As to the form of these mushrooms, their root is strong, uneven, divided according to its longitudinal direction, and composed of fibres as fine as hairs, interwoven one with another. Their form, on first shooting out, resembles a small bladder, scarcely larger than the bud of a vine; and if in this state they are squeezed between the fingers, an aqueous subacid liquor issues out. When at their full growth, their pedicle is of a finger’s length, larger at top than at bottom, and becomes insensibly slenderer in proportion as it is nearer the earth. These mushrooms are also formed in an umbrella shape, and variegated with an infinity of little specks, situated very near one another. They are smooth and even on the upper part, but underneath leafy, like the common mushrooms. Their

taste is likewise very agreeable, and the sick are not debarred from eating them when dressed in a proper manner.—Some naturalists and physicians submitted these stones to chemical analysis, in order to be more competent judges of the uses they might be put to in medicine; when there first came forth, by distillation, an insipid water, and afterwards a spirituous liquor. The retort having been heated to a certain point, there arose an oil, which had nearly the smell and taste of that of guaiacum; and a very acid salt was extracted from the ashes.

We must not omit **THE CHANGEABLE STONE**.—There are three of these remarkable stones in the British Museum; the largest of them about the size of a cherry-stone, but of an oval form. It is opaque, and coloured like a common yellow pea; it may be scratched, though not without difficulty, by a common knife, notwithstanding which, it seems to leave a mark upon glass. It does not ferment with nitrous acid. When it has lain some hours in water, it becomes transparent, and of a yellow amber colour. The change begins soon after the immersion, and at one end, in form of a little shot; but in a small one of the same kind, the transparency begins round the edges. By degrees the spot increases, until the whole stone becomes uniformly clear throughout: when out of the water it loses its transparency, first at one end, and then gradually over the remainder, until the whole has become opaque, which change happens in less than it takes to become transparent. This change is not entirely peculiar to the hydrophanes. Bergman informs us, that some steatites produce the same effect; and M. Magellan, that the crust of chalcidones and agates frequently produce the same appearance. Messrs. Buckman and Veltheim were the first who particularly inquired into the nature of this stone, and investigated its properties. Their account is as follows:—"As soon as the stone is put into water, it exhales a musty smell, several air bubbles arise, and it becomes gradually transparent. Some of the stones become colourless as soon as they are thoroughly transparent; others have a more or less deep yellow colour; some acquire a beautiful ruby colour; and others gain a fine colour of mother-of-pearl, or of a bluish opal. Whatever be the colour of the liquor in which the hydrophanes is immersed, it gains only its usual degree of transparency with the colour peculiar to it. When we look at it in its moist state, we perceive a luminous point, varying its situation as the position of the eye is altered." This luminous point is not, according to Mr. Bruckman, the immediate image of the sun, but a reflection of that image refracted in the substance of the stone itself; a phenomenon which probably gave rise to its name of

OCULUS MUNDI. Mr. Bruckman left a piece of this stone, weighing 35 grains, seven hours in water, the space requisite to make it perfectly transparent; and in that time he found that it had gained three grains in weight. The hydrophanes becomes much sooner transparent when put into hot water; and the same happens if it be dipped in a very dilute acid, or rather a very dilute solution of alkali. When dipped in oil of vitriol, it becomes very quickly transparent, and will continue so on account of the strong attraction of that acid for moisture, which takes as much from the atmosphere as is necessary to keep the stone transparent; but its opacity will return, if it be dipped in an alkaline liquor, and then dried.

An account of a **WONDERFUL DIAMOND, IN THE ISLAND OF BORNOU.**—The rajah of Mathan possesses the finest and largest diamond in the world, that has hitherto been discovered. This diamond, which is said to be of the finest water, weighs 367 carats. The celebrated Pitt diamond weighs only 127 carats. The Mathan diamond is shaped like an egg, with an indented hollow near the smaller end. It was discovered at Landak, about ninety years ago; and though the possession of it has occasioned numerous wars, it has been about eighty years in the possession of the Mathan family. Many years ago, the governor of Batavia sent a Mr. Stuvart to ascertain the weight, quality, and value of this diamond, and to endeavour to purchase it; and in his mission, he was accompanied by the sultan of Pontiana. After examining it, Mr. Stuvart offered 150,000 dollars for the diamond, the sum to which he was limited; and, in addition to this sum, two war-brigs, with their guns and ammunition, together with a certain number of great guns, and a quantity of powder and shot. The rajah, however, refused to deprive his family of so valuable an hereditary possession, to which the Malays attach the miraculous power of curing all kinds of diseases, by means of the water in which it is dipped, and with which they imagine the fortune of the family is connected.

We shall close our department of remarkable Stones, with the following account of **A SINGULAR CURIOSITY.**—Mr. Sloughton, the Spanish Consul at Boston, in North America, has in his possession a flint pebble, obtained amongst ballast stone, thrown from a vessel at an eastern port. When broken, it presented two half heads in profile; all the outlines of feature and hair were perfectly distinct, and the heads were of a darker colour than the rest of the stone. What is most surprising is, that the one face was male and the other female; and even the putting up of the hair was appropriate to the sexes: they were situated, in the stone, face to face.

CHAP. XXXVIII.

CURIOSITIES RESPECTING MOUNTAINS.

*Natural Description of Mountains—The Peak in Derbyshire—
Snowden in Wales—Skiddaw in Cumberland.*

— Sublime the uplifted mountains rise,
And with their pointed heads invade the skies;
While the high cliffs their craggy arms extend,
Distinguish states, and sever'd realms defend. *Blackmore.*

NATURAL DESCRIPTION OF MOUNTAINS.

ALMOST all the tops of the highest mountains are bare and pointed; which proceeds from their being continually assaulted by storms and tempests. All the earthy substances with which they might have been once covered, have for ages been washed away from their summits; and nothing is left but immense rocks, which no tempest has hitherto been able to destroy. Nevertheless, time is every day making depredations, and huge fragments are seen tumbling down the precipices, either loosened from their summits by the rains and frost, or struck down by lightning. Nothing can exhibit a more terrible picture than one of these enormous masses, commonly larger than a house, falling from its height, and rolling down the side of the mountain with a noise louder than thunder. Dr. Plot tells us of one in particular, which being loosened from its bed, rolled down the precipice, and was partly shattered into a thousand pieces. One of the largest fragments, however, still preserving its motion, travelled over the plain below, crossed a rivulet in the midst, and at last stopped on the other side of the bank! These fragments are often struck off by lightning, and sometimes undermined by rains; but the most usual manner in which they are disunited from the mountain is by frost: the rains first insinuate and find their way between the interstices of the mountain, and continue there until by the intense cold they are converted into ice, when the water swells with an irresistible force, and produces the same effect as gunpowder, splitting the most solid rocks, and thus shattering their summits. Sometimes whole mountains are, by various causes, disunited from each other. In many parts of the Alps, there are amazing clefts, the sides of which so exactly correspond with the opposite, that no doubt can be entertained of their having been once joined. At Cajeta, in Italy, a mountain was split in this manner by an earthquake; and there is a passage opened through it, that appears as if done by the industry of man.

In the Andes these breaches are often seen. That at Thermopylæ in Greece has been long famous. The mountain of the Troglodytes in Arabia has thus a passage through it; and that in the late duchy of Savoy, which Nature began, and which Victor Amadeus completed, is an instance of the same kind. "In June, 1714, a part of the mountain of Diableret, in the district of Valais, in France, suddenly fell down, between two and three P. M. the weather being very calm and serene. This mountain, which was of a conical figure, destroyed fifty-five cottages in its fall. Fifteen persons, with about one hundred beasts, were also crushed beneath its ruins, which covered an extent of ground of a league square. The dust it occasioned instantly enveloped all the neighbourhood in darkness. The heaps of rubbish were more than three hundred feet high. They stopped the current of a river that ran along the plain, which now is formed into several new and deep lakes. There appeared, through the whole of this rubbish, none of those substances that seemed to indicate that this catastrophe had been occasioned by means of subterraneous fires. Most probably, the base of this rocky mountain had been decomposing through the lapse of many ages, and thus fell without any extraneous violence."

In 1618, the town of Fleurs, in France, was buried beneath a rocky mountain, at the foot of which it was situated. Such accidents are produced by various causes: by earthquakes; by being decayed at the bottom; or by the foundation of one part of the mountain being hollowed by waters, and, thus wanting a support, breaking from the other. Thus it generally has been found in the great chasms in the Alps; and it is almost always the case in those disruptions of hills, called land-slips: these are nothing more than the sliding down of a higher piece of ground, driven from its situation by subterraneous inundations, and settling upon the plain below. There is not an appearance in nature that so much astonished our ancestors as these land-slips. To behold a large upland, with its houses, corn, and cattle, at once loosened from its place, and floating as it were upon the subjacent water,—to see it quitting its ancient situation, and sailing forward like a ship,—is certainly one of the most extraordinary appearances that can be imagined, and, to a people ignorant of the powers of nature, might well be considered as a prodigy. Accordingly, we find all our old historians mentioning it as an omen of approaching calamities. In this more enlightened age, however, its cause is well known; and, instead of exciting ominous apprehensions in the populace, it only gives rise to some very ridiculous law-suits among the several claimants, whose property thus divided from its kindred soil shall be; whether the land shall belong to the original pos-

essor, or to him upon whose grounds it has encroached and settled.

In the lands of Hatberg, in Ireland, there stood a declivity gradually ascending for nearly half a mile. On the 10th of March, 1713, the inhabitants perceived a crack on its side, like a furrow made with a plough, which they imputed to the effects of lightning, as there had been a thunder-storm the night before. However, on the evening of the same day, they were surprised to hear a hideous confused noise issuing all around from the side of the hill; and their curiosity being awakened, they resorted to the place. There, to their amazement, they found an extent of ground, of nearly five acres, all in gentle motion, and sliding down the hill upon the subjacent plain. This motion, together with the noise, continued the remaining part of the day, and the whole of the following night; the noise proceeding, probably, from the attrition of the ground beneath. The day following, this strange journey down the hill ceased; and above an acre of the meadow below was found covered with what before composed a part of the declivity. But such tremendous land-slips, when a whole mountain's side descends, happen very rarely.

There are some of another kind, however, much more common; and as they are always sudden, much more dangerous. These are snow-slips, or avalanches, well known, and greatly dreaded by travellers. They are justly described in the following beautiful lines of one of our poets:—

By an hundred winters piled,
Where the glaciers, dark with death,
Hang o'er precipices wild,
Hang suspended by a breath.

If a pulse but throb alarm,
Headlong down the steeps they fall;
For a pulse will break the charm,
Bounding, bursting, burying all.

It often happens, that when snow has long been accumulated on the tops and on the sides of mountains, it is borne down the precipice either by tempests, or by its own melting. At first, when loosened, the volume in motion is but small, but it gathers as it continues to roll; and by the time it has reached the habitable parts of the mountain, it is generally grown to an enormous bulk. Wherever it rolls, it levels all things in its way, or buries them in unavoidable destruction. Instead of rolling, it sometimes is found to slide along from the top; yet even thus, it is generally fatal. Nevertheless, we had an instance a few years ago, of a small family in Germany, that lived for above a fortnight under one of these snow-slips. Although they were buried during the whole of

that time in utter darkness, and under a bed of some hundreds of feet deep, yet they were providentially taken out alive; the weight of the snow being supported by a beam that kept up the roof, and nourishment supplied to them by the milk of a she-goat, that was buried under the same ruin.

A DESCRIPTION OF THE PEAK IN DERBYSHIRE, from Moritz's Travels in several parts of England.

Having arrived in Derbyshire, a distance of 170 miles from London, the author thus describes the town of Castleton, in which the Peak is situated:—

“ I ascended one of the highest hills, and all at once perceived a beautiful vale below me, which was traversed by rivers and brooks, and inclosed on all sides by hills. In this vale lies Castleton, a small town, with low houses; so named from an old castle, whose ruins are still to be seen here.

“ A narrow path, which wound itself down the side of the rock, led me through the vale into the street of Castleton, where I found an inn, and dined. After dinner, I made the best of my way to the cavern.

“ A little rivulet, which runs through the middle of the town, led me to its entrance.

“ I stood here a few moments, full of wonder and astonishment at the amazing height of the steep rock before me, covered on each side with ivy and other shrubs. At its summit are the decayed walls and towers of an ancient castle, which formerly stood on this rock; and at its foot the monstrous aperture, or mouth to the entrance of the cavern; where it is totally dark, even at mid-day.

“ As I was standing here full of admiration, I perceived at the entrance of the cavern, a man of a rude and rough appearance, who asked me if I wished to see the Peak; and an echo strongly reverberated his coarse voice.

“ Answering him in the affirmative, he next inquired if I should want to be carried to the other side of the stream; telling me at the same time what the sum would be which I must pay for it.

“ This man had, along with his black stringy hair, and his dirty and tattered clothes, such a singularly wild and infernal look, that he actually struck me as a real Charon: his voice, and the questions he asked me, were not of a kind to remove this notion; so that far from its requiring any effort of imagination, I found it not easy to avoid believing, that at length I had actually reached Avernus,—was about to cross Acheron, —and to be ferried by Charon!

“ I had no sooner agreed to his demand, than he told me, all I had to do was boldly to follow him,—and thus we entered the cavern.

"In the entrance of the cavern lay the trunk of a tree that had been cut down, on which several of the boys of the town were playing."

"Our way seemed to be altogether on a descent, though not steep; so that the light, which came in at the mouth of the cavern near the entrance, gradually forsook it; and when we had gone forward a few steps farther, I was astonished by a sight, which, of all others, I here the least expected: I perceived to the right, in the hollow of the cavern, a whole subterranean village, where the inhabitants, on account of its being Sunday, were resting from their work, and with happy and cheerful looks were sitting at the doors of their huts along with their children."

"We had scarcely passed these small subterranean houses, when I perceived a number of large wheels, on which on week-days these human moles, the inhabitants of the cavern, made ropes."

"I fancied I here saw the wheel of Ixion, and the incessant labour of the Danaïdes."

"The opening through which the light came, seemed, as we descended, every moment to become less and less, and the darkness at every step to increase, till at length only a few rays appeared, as if darting through a crevice, and just tingeing the small clouds of smoke which at dusk raised themselves to the mouth of the cavern."

"This gradual increase of darkness awakens in a contemplative mind a soft melancholy. As you go down the gentle descent of the cavern, you can hardly help fancying the moment is come when you are about to bid a final farewell to the abodes of mortals."

"At length the great cavern in the rock closed itself, in the same manner as heaven and earth seem to join in the horizon. We then approached a little door, where an old woman came out of one of the huts, and brought two candles, of which we each took one."

"My guide now opened the door, which completely shut out the faint glimmering of daylight, which till then it was still possible to perceive, and led us to the inmost centre of this dreary temple of old Chaos and Night, as if till now we had only been traversing the outer coasts of their dominions. The rock was here so low that we were obliged to stoop very much for some few steps, in order to get through; but how great was my astonishment, when we had passed this narrow passage, and again stood upright, at once to perceive, as well as the feeble light of the candles would permit, the amazing length, breadth, and height of the cavern, compared to which, the monstrous opening through which we had already passed was nothing."

"After we had wandered here more than an hour, as beneath a dark and dusky sky, on a level sandy soil, the rock gradually lowered itself, and we suddenly found ourselves on the edge of a broad river, which, from the glimmering of our candles amid the total darkness, suggested a variety of interesting reflections. To the side of this river a small boat was moored, with some straw in its bottom. Into this vehicle my guide desired me to step, and lay myself down in it quite flat, because, as he said, towards the middle of the river the rock would almost touch the water.

"When I had laid myself down as directed, he himself jumped into the water, and drew the boat after him. All around us was one still, solemn, and deadly silence; and as the boat advanced, the rock seemed to stoop, and come nearer and nearer to us, till at length it nearly touched my face; and, as I lay, I could hardly hold the candle upright. I seemed to myself to be in a coffin rather than in a boat, as I had no room to stir hand or foot till we had passed this frightful strait, and the rock rose again on the other side,—where my guide once more handed me ashore.

"The cavern was now become all at once broad and high, and then suddenly it was again low and narrow. I observed on both sides, as we passed along, a prodigious number of great and small petrified plants and animals; but these we could not examine, unless we had been disposed to spend some days in the cavern.

"And thus we arrived at the opposite side, at the second river or stream, which, however, was not so broad as the first, as one may see across it to the other side: over this stream my guide carried me on his shoulders, because there was here no boat to ferry us.

"From thence we only went a few steps farther, when we came to a very small piece of water, which extended itself lengthways, and led us to the end of the cavern.

"The path along the edge of this water was wet and slippery, and sometimes so very narrow that I could hardly set one foot before the other.

"Notwithstanding, I wandered with pleasure on this subterraneous shore, and was regaling myself with the interesting contemplation of all these various wonderful objects, in this land of darkness, and shadow of death,—when, all at once, something like music at a distance sounded in my ears. I instantly stopped, full of astonishment, and eagerly asked my guide what this might mean. He answered, "Only have patience, and you shall soon see." But as we advanced, the sounds of harmony seemed to die away, the noise became weaker, and at length it appeared to dwindle into a gentle hissing or hum. like distant drops of falling rain.

"It is not difficult to imagine how great was my wonder, when ere long I actually saw and felt a violent shower of rain falling from the rock as from a thick cloud, threatening to extinguish our candles, and leave us in entire darkness. It was this that had caused the melancholy sound which I had heard at a distance, the soft notes of which had been assisted by the distant echo.

"To this shower which fell from the ceiling or roof of the cavern through the veins of the rock, the inhabitants had given the name of a mizzling rain.

"We continued our march along the sides of the water, and often saw on its banks large apertures of the rock, which seemed to be new or subordinate caverns, all of which we passed without looking into. At length my guide prepared me for one of the finest sights we had yet beheld, and which was now soon to burst on our view.

"We had gone but a few paces farther, when we entered what might easily be taken for a majestic temple, with lofty arches, supported by beautiful pillars, formed by the plastic hand of some ingenious artist.

"This subterraneous temple, in the structure of which no human hand had borne a part, appeared to me at that moment to surpass all the most stupendous buildings I had ever seen, in point of regularity, magnificence, and beauty.

"Deeply impressed with awe and reverence at this grand display of the Creator's works, my mind became insensibly solemnized; and I felt that it became me silently to adore the Author of all, and acknowledge the hand of the divine Architect.

From the Peak in Derbyshire, we shall conduct our reader to SNOWDEN IN WALES; to the top of which Miss Elizabeth Smith, a young lady of uncommon attainments, made an excursion, and published an account of her adventure, in nearly the following language.

"Snowden is the loftiest of the Welsh mountains, being 3020 feet above the level of the sea.

"We set off, about eleven at night, for the foot of Snowden, and travelled eight miles through a fine mountainous country, by moon-light. Before one, we arrived at a little hut where the guide lives; and after having him called up, and loaded with a basket of bread and milk, and a tin box for specimens, we began our march at a quarter past one. The clouds were gathering over the mountains, and threatening us with either darkness or rain. We however escaped both, and were only amused with every variety they could give the landscape, by hiding or obscuring the moon, and blotting out now one mountain, and now another, from our view; till about two o'clock,

when the dawn began to appear, they covered the moon, and we saw her no more. We proceeded by a very easy ascent over boggy ground till half past two, when, coming suddenly to the top of the first range of hills, and meeting with a violent wind which blew from the quarter where the sun was to rise, (for we ascended the mountain on the south west,) Mrs G. S. was frightened, and seeing a very steep ascent before her, said she would sit down and wait our return. My mother said she would stay with her, and I proposed our all going back together; but my mother very kindly insisted on my proceeding. We therefore divided our provisions; the ladies returned to the hut from which they had set out, and I went on with the guide, who could not speak a word of English. We steered our course more towards the south, and toiled up several mountains, in some parts covered with loose stones, which had fallen from their broken summits, but in general overgrown with different sorts of moss, and a kind of short grass, mixed with immense quantities of the *galium pusillum*. I picked up a few other plants, but on the whole was disappointed in the botanical way, as I found very little that I had not before met with on the mountains in this neighbourhood; however, this is not the time of the year (July) for mountain curiosities. I went on as fast as I could, without stopping, except now and then for a moment to look down on the mountains, under my feet, as clouds passed over them, thinking each summit I saw before me was the last, and unable to gain any information from my guide to satisfy my impatience, for I wished to be at the top before sun-rise, and pink clouds now began to appear over the steep I was climbing. I also knew that the ladies would be very impatient for my return; nor was I without anxiety on their account, as I was not sure they would find their way back to the hut. These ideas occupied my mind all the way up; and if that deceitful, but comforting lady, Hope, had not continually presented to me the range of hills I was ascending as the last step in ambition's ladder, I am not sure that, with all my eagerness to get on the top, I should not have returned back.

"I was debating this point very earnestly with myself, in ascending an almost perpendicular green slope, when, on a sudden, I saw at my feet an immense chasm, all in darkness, and of a depth I cannot guess, certainly not less than a hundred feet; I should suppose much more. It answers in some respects to the idea I have formed of the crater of a violent volcano, but evidently is not that, as there is no mark of fire, the rock being composed, as it is in general throughout this country, of a sort of slate. Nor does the mountain appear to have been thrown down, but the pit to have sunk in; which must probably has been occasioned by subterranean waters,

as there is water at the bottom of the pit, and the mountain is full of springs. You think now you are at the top, but you are mistaken. I am standing indeed at the top of the abyss, but with a high rocky peak on each side of me, and descending almost perpendicularly into the lake at the bottom. I have been taking a rough sketch of one of these peaks, with the lake in the deepest shadow; I am turning over my paper, which the wind renders very difficult, in order to draw another; I look up, and the upper part illuminated by a beautiful rose-coloured light, while the opposite part still casts a dark shade over its base, and conceals the sun from my view. If I were ready to jump into the pit with delight at first seeing it, my ecstasy now was still greater. The guide seemed quite delighted to see me so much pleased, and took care, in descending, to lead me to the edge of every precipice, which he had not done in going up. I, however, presently recollected, that I was in a great hurry to get back, and set off along the brink of the cavity for the highest peak, where I arrived at a quarter past four, and saw a view, of which it is impossible to form any idea from description. For many miles around, it was composed of tops of high mountains, of all the various forms that can be imagined: some appeared swimming in an ocean of vapour; on others, the clouds lay like a cap of snow, appearing as soft as down. They were all far below Snowden, and I was enjoying the finest blue sky, and the purest air I ever breathed. The whole prospect was bounded by the sea, except to the east and south-east, and the greatest part of the lands in those parts were blotted out by clouds. The sun, however, rose so far toward the north-east, as to be still hanging over the sea. I took a sketch of a small part of the mountains, with some of the little lakes which appear at their feet,—sat down, for the first time, on a circle of stones which is built on the top of the hill,—and made great havock in the bread and milk, in which achievement the guide equalled, if not surpassed me,—and at half past four, almost frozen, I began to descend. My anxiety about my friends increased, as I came near the spot where I had left them; I made all possible haste, and found them safe in the hut, at ten minutes past six. It certainly would have been pleasanter to have had more time, and some one to enjoy the expedition with me; but I am delighted that I have been, and would not for any thing give up the recollection of the sublime scene.”

We shall close this chapter with an account of SKIDDAW.—This is a mountain of England, in Cumberland, one of the most remarkable in the kingdom, being above 3000 feet in perpendicular height, from the surface of the Derwent-water,

which lake is far distant from the sea, and high above its level from this circumstance. Skiddaw is reckoned the highest mountain in England. The prospect from its top is very extensive, and, being detached from other mountains, forms a grand object from various points of view. It is easy of access, and the sides are covered with grass. At the top, the atmosphere is uncommonly rare. It is covered with loose brown slate-stone.



CHAP. XXXIX.

CURIOSITIES RESPECTING MOUNTAINS.—(Continued.)

*The Andes—Pichinca—Monte Bolea—Pausilipo—Monte Nuovo
—Spectre of the Broken—Gauts, or Indian Appenines—Pico
—Written Mountains—Athos—Sulphur Mountains.*

———His proud head the airy mountain hides,
Among the clouds; his shoulders and his sides,
A shady mantle clothes.

Denham.

THE ANDES.

THE Andes is a great chain of mountains in South America, which, running from the most northern part of Peru, to the Straits of Magellan, between 3000 and 4000 miles, are the longest and most remarkable in the world. The Spaniards call them the *Cordilleras de los Andes*: they form two ridges; the lowermost of which is overspread with woods and groves, and the uppermost covered with everlasting snow. Those who have been at the top, affirm that the sky is always serene and bright, the air cold and piercing, and yet so thin that they were scarce able to breathe. When they looked downwards, the country was hid by the clouds that hovered on the mountain's sides.

The mountains just mentioned, which have been frequently ascended, are much inferior in height to many others in this enormous chain.

The following is the account given of the mountain called Pichincha, by Don George Juan, and Don Antonio de Ulloa, two mathematicians, sent by the kings of France and Spain, to make observations in relation to the figure of the earth. These mathematicians suffered extremely, as well from the severity of the cold, as from the impetuosity of the winds, which on these heights blow with incessant violence; difficulties the more painful, as they had been little used to such sensations. Thus, in the torrid zone, nearly under the equi-

noctual line, where it is natural to suppose they had most to fear from the heat, their greatest pain was caused by the excessiveness of the cold. Their first scheme, for shelter and lodging in these uncomfortable regions, was to pitch a field-tent for each company: but on Pichinca, this could not be done, from the narrowness of the summit; they were therefore obliged to be contented with a hut so small, that the whole of the company could scarcely creep into it. Nor will this appear strange, if the reader considers the bad situation and smallness of the place, it being one of the loftiest crags of a rocky mountain, 100 fathoms above the highest desert of Pichinca. Such was the position of their mansion, when all the other adjacent parts soon became covered with ice and snow. The ascent up this stupendous rock, from the base, or the place where the mules could come to their habitation, was so craggy, as only to be climbed on foot; and to perform it, cost them four hours' continual labour and pain, arising not only from the violent efforts of the body, but the subtlety of the air, which was so thin, and probably overcharged with the lighter respirable gases, as to render respiration difficult.

Our philosophers generally kept within their hut. Indeed, they were obliged to do this, on account of the intenseness of the cold, the violence of the wind, and their being continually involved in so thick a fog, that an object at six or eight paces was hardly discernible. When the mist cleared up, the clouds, by their gravity, moved nearer to the surface of the earth, and on all sides surrounded the mountains to a vast distance, forming no bad representation of the sea, with their rock, like an island, stationed in its centre. When this happened, they heard the horrid noises of the tempests, which then spent their fury on Quito and the neighbouring country. They saw the lightnings issue from the clouds, and heard the thunders roll far beneath them; and whilst the lower parts were involved in tempests of thunder and rain, they enjoyed a delightful serenity, the wind was hushed, the sky became clear, and the enlivening rays of the sun moderated the severity of the cold. But their circumstances were very different, when the clouds reascended: their thickness rendered respiration difficult; the snow and hail fell continually; and the wind returned with all its violence; so that it was impossible entirely to overcome the fears of being, together with their hut, blown down the precipice, on the edge of which it was built, or of being buried by the daily accumulations of ice and snow.

The wind was often so violent in these regions, that its velocity dazzled the sight, whilst their fears were increased, from the dreadful concussions of the precipice, caused by the

fall of enormous fragments of rocks. These crashes were the more alarming, as no other noises are heard in such solitary abodes: and during the night, their rest, which they so greatly wanted, was frequently disturbed by these sudden sounds. When the weather was fair near their hut, and the clouds gathered about some of the other mountains which they had selected for their observations, so that they could not make all the use they desired of this interval of good weather, they left their hut, to exercise themselves. Sometimes they descended to a small distance; and, at other times, amused themselves with rolling large fragments of rocks down the precipice; and these frequently required the joint strength of them all, though they often saw the same effected by the mere force of the wind. But they always took care, in their excursions, not to go so far out, but that, on the least appearance of the clouds gathering about their cottage, which often happened very suddenly, they could regain their shelter. The door of their hut was fastened with thongs of leather, and on the inside not the smallest crevice was left unstopped; besides which, it was very compactly covered with straw: but, notwithstanding all their care, the wind penetrated through.

The days were often little better than the nights; and all the light they enjoyed, was that of a lamp or two, which they kept continually burning. Though their hut was small, and crowded with inhabitants, besides the heat of the lamps, yet the intenseness of the cold was such, that every one of them was obliged to have a chafing-dish of coals. These precautions would have rendered the rigour of the climate supportable, had not the imminent danger of perishing, by being blown down the precipice, roused them every time it snowed, to encounter the severity of the outward air, and sally out, with shovels, to force from the roof of their hut, the masses of snow which were gathering on it. Nor would it, without this precaution, have been able to support the weight. They were not indeed without servants and Indians, but these were so benumbed with the cold, that it was with great difficulty they could get them out of a small tent, where they kept a continual fire. So that, all our artists could obtain from them, was to take their turns in this labour; and even then they went very unwillingly about it, and consequently performed it but slowly.

The reader may easily judge what our philosophers suffered from the asperities of such a climate. Their feet were swelled, and so tender, that they could not even bear the heat of the fire, and walking was attended with extreme pain. Their hands were covered with chilblains; their lips swelled and chopped, so that every motion in speaking drew blood; consequently they were obliged to observe strict taciturnity, and

were little disposed to laugh, as, by causing an extension of the lips, it produced such wounds as were very painful for two or three days after.

Their common food in this inhospitable region was a little rice boiled with some flesh or fowl, procured from Quito; and, instead of fluid water, their pot was filled with ice: they had the same resource with regard to what they drank; and while they were eating, every one was obliged to keep his plate over a chafing-dish of coals, to prevent his provisions from freezing. The same was done respecting the water. At first they imagined the drinking of strong liquors would diffuse a heat through the body, and consequently render it less sensible of the painful sharpness of the cold; but, to their surprise, they felt no manner of strength in such liquors, nor were they any greater preservatives against the cold than even common water.

It is affirmed, that there are in the Andes sixteen volcanoes, or burning mountains, which throw out fire and smoke with a terrible noise. The height of Chimborazo, said to be the highest peak of the Andes, has been determined by geometrical calculations to be 20,282 feet. As all or most rivers have their source in mountains, it is no wonder a great number run down the sides of the Andes. Some hurry along with a prodigious rapidity, while others form beautiful cascades, or run through holes in rocks, which look like bridges of a stupendous height. There is a public road through the mountains, 1000 miles in length, part of which runs from Quito to Cusco.

MONTE BOLEA.—This is a hill or mount in the neighbourhood of Verona, in the north of Italy, celebrated for the uncommon abundance and remarkable variety of the organic remains which it exhibits, as well as for the striking relations these bear to minerals of volcanic origin. This spot has long attracted the attention of philosophic inquirers, and even excited the curiosity of the vulgar. Various collections of its petrifications have been made, and a considerable number of labourers are occasionally employed in digging and preparing specimens. There are many treatises purposely devoted to the description and arrangement of its fossils, to a minute examination of its geognostic relations, and to laborious disquisitions on the manner in which it must have been formed.

In the neighbourhood of the mount, and over a great part of the territory of Verona, there are seen undoubted products of volcanic eruptions, together with masses of petrified animal and vegetable substances. The hill itself presents a great variety and singular combination of mineral phenomena, of

different origin and nature. Its greater proportion is composed of an aggregation of organic remains, and seems a cemetery of shells, fishes, marine animals, birds, and quadrupeds. Some of its beds consist of a range of certain species possessing a considerable similarity; while in others, animals of the most opposite habits, and inhabiting different regions of the globe, as well as different elements of nature, are strangely brought into contact, and confusedly blended in one heterogeneous mass. Shell-fish of the rivers and of the sea, corals, fishes of various kinds, insects, bones of different species of birds, remains of elephants, bears, and other quadrupeds, requiring for their existence different climates, are here united in an extraordinary assemblage. Connected with these, we find basaltic columns, scoriæ, lava, and other volcanic productions. These facts lead us to conclude, that this spot has witnessed wonderful revolutions, and that it has been subject, at different periods of its history, or perhaps nearly at the same time, to the dominion of two powerful elements, of which the ravages only are now visible.

PAUSILIPO,—which is the next we would speak of, is a celebrated mountain of Naples, five miles from Puzzoli, famous for its grotto, or rather a subterraneous passage through it, which is near a mile long, about twenty feet broad, and from thirty to forty in height. The gentry who go there to gratify their curiosity, generally drive through it with lighted torches; but the country people find their way with little difficulty, by the light which enters at each end, and by two holes pierced through the mountain from the top, near the middle of the passage. This mountain is rendered an object of still greater fame and veneration, by possessing the tomb of Virgil, which is overgrown with ivy, and shadowed with the spreading boughs of an ancient laurel tree.

MONTI NUOVO,—is a mountain in the environs of Naples, which blocks up the valley of Averno. "This mountain (Mr. Swinburne tells us) arose in 1538: after repeated quakings the earth burst asunder, and made way for a deluge of hot ashes and flames, which rising extremely high, and darkening the atmosphere, fell down again and formed a circular mound four miles in circumference, and one thousand feet high, with a large cup in the middle. The wind rising afterwards, wafted the lighter particles over the country, blasted vegetation, and killed the animals which grazed; the consequence was, that the place was deserted, till Don Pedro de Toledo, viceroy of Naples, encouraged the inhabitants by his example to return.

“Part of Monte Nuovo is cultivated, but the larger portion of its declivity is wildly overgrown with prickly broom, and rank weeds that emit a very fetid sulphureous smell. The water in the valley is shallow, its inside towards the mountain is clad with shrubs, and the little area at the bottom planted with fig and mulberry trees; a most striking specimen of the amazing vicissitudes that take place in this extraordinary country. I saw no traces of lava, or melted matter, and few stones within. Near the foot of this mountain the subterraneous fires act with such immediate power, that even the sand at the bottom of the sea is heated to an intolerable degree.”

The next object that claims our attention is *THE SPECTRE OF THE BROKEN*.—A curious phenomenon observed on the *Broken*, one of the Hartz mountains in Hanover, of which the following account is given by M. Haree, “On being here, says he, for the thirtieth time, and having procured information respecting the above-mentioned atmospheric phenomenon, I was at length, on the 23d of May, 1797, so fortunate as to have the pleasure of seeing it for myself; and perhaps a description of it may afford satisfaction to others who visit the Broken through curiosity. The sun rose about four o’clock, and the atmosphere being quite serene towards the east, his rays could pass without any obstruction over the Heinrichshöhe.

In the S. W. however, towards Achtermannshöhe, a brisk west wind carried before it thin transparent vapours, which were not yet formed into thick heavy clouds. About a quarter past four I went towards the inn, and looked round to see whether the atmosphere would permit me to have a free prospect to the S. W.; when I observed, at a very great distance, towards Achtermannshöhe, a human figure of a monstrous size. A violent gust of wind having almost carried away my hat, I clapped my hand to it; by moving my arm towards my head; and the colossal figure did the same. The pleasure which I felt on this discovery can hardly be described, for I had already walked many a weary step in the hopes of seeing this shadowy image, without being able to gratify my curiosity. I immediately made another movement by bending my body; and the colossal figure before me repeated it. I was desirous of doing the same thing once more,—but my colossus had vanished.

“I remained in the same position, waiting to see whether it would return; and in a few minutes it again made its appearance on the Achtermannshöhe. I paid my respects to it a second time; and my compliment was returned by a similar inclination of the body, in the figure before me. I then called

the landlord of the Broken, and having both put ourselves in the same position I had taken alone, we looked towards the Achtermannshöhe, but saw nothing. We had not, however, stood long, before two similar colossal figures were formed over the above eminence, which, after repeating the various gesticulations of our bodies, vanished. We, however, still retained our position, keeping our eyes fixed on the same spot, and in a little while the two figures again stood before us, and were joined by a third, who had by this time added himself to our company. Every movement that we made by bending our bodies, these figures imitated,—but with this difference, that the phenomenon sometimes was weak and faint, and at others strong and well defined.

“Having thus had an opportunity of discovering the whole secret of this extraordinary appearance, I can give the following information to such of my readers as may be desirous of seeing it for themselves. When the rising sun, and, according to analogy, the case will be the same when the setting sun throws his rays over the Broken, upon the body of a man standing opposite to fine light clouds floating around, or hovering past him, he needs only fix his eyes stedfastly upon them, and in all probability he will see the singular spectacle of his own shadow, extending to the length of five or six hundred feet, at the distance of about two miles before him.” It is said, there is, in the Manchester Transactions, an account of a similar phenomenon observed by Dr. Ferrier, on a hill in England.”

THE GAUTS, OR INDIAN APPENINES.—These form a stupendous wall of mountains, which extends from Cape Comorin, the southern point of the Peninsula of Hindoostan, to the Tapti, or Surat river, at unequal distances from the sea coast; it is seldom more than sixty miles, commonly about forty, and in one part approaches within six miles. These mountains rise abruptly from the country of Concan, bounding, in the form of a terrace, a vast extent of fertile and populous plains, which are so elevated as to render the air cool and pleasant. The height is supposed to be from 3000 to 4000 feet.

This celebrated ridge does not terminate in a point when it approaches the Tapti; but, departing in this place from its meridional course, it bends eastward in a serpentine line, parallel to the river, and is afterwards lost among the hills in the neighbourhood of Burrhampour. In its course along the Tapti, it forms several passes or descents towards that river, from whence it derives the name of Gauts, which means a landing-place. The alternate N. E. and S. W. winds, called monsoons, occasion a rainy season only on one side, viz. on the windward side of these mountains

We would now wish to draw the attention of the reader from the Indian Appenines, to PICO, a mountain which rears its lofty head in an island of the same name.—It is filled with dismal dark caverns, or volcanoes, which frequently emit flame, smoke, and ashes, to a great distance. At the foot of it, towards the east, is a spring of fresh water, which is generally cold, but sometimes is so heated with subterraneous fire, as to rush forth in torrents, with a kind of ebullition like boiling water; equalling that in heat, and sending forth a steam of sulphureous fetid vapours, mixed with liquefied stones, minerals, and flakes of earth, all on fire, in such quantities, and with such violence, as to form a kind of promontory, on the declivity of the coast, and at the distance of 1200 paces from the fountain, which is vulgarly called Mysterious.—Such is the account given by Ortelius.

WRITTEN MOUNTAINS, MOUNTAINS OF INSCRIPTIONS, or JIBBEL EL MOKATTEB.—This is a mountain, or chain of mountains, said to be in the wilderness of Sinai; and the marble, of which it is composed, is reported to be inscribed to a considerable extent with innumerable characters, reaching from the ground sometimes to the height of twelve or fourteen feet. These were mentioned by a Greek author in the third century; but although some of them have been copied by Pococke, Montague, and other late writers, some have affected to entertain doubts whether even the mountains themselves really exist.

The vast number of these inscriptions, the desert place in which they are found, and the length of time requisite for executing the task, induced a notion that they are the work of the Israelites during their forty years' wandering in the wilderness. Others are of opinion, that they consist merely of the names of travellers, and the dates of their journeys. M. Niebuhr, who visited this country in September, 1762, made every attempt in his power, though without success, to obtain a sight of this celebrated mountain. After much vain inquiry, he was at last conducted to some rocks, upon which there were inscriptions in unknown characters. They are most numerous in a narrow pass between two mountains, named *Omer-ridstein*; and, says M. Niebuhr, "the pretended Jibbel El Mokatteb, may possibly be in its neighbourhood." Some of these inscriptions were copied by our author, but he does not look upon them to be of any consequence. At length, when M. Niebuhr arrived at the mountain to which the shiek had promised to conduct him, he found no inscription; but on climbing up to the top, he discovered an Egyptian cemetery, the stones of which were covered with hieroglyphics. The tomb-stones were from five to seven feet long, some being

erect, and others lying flat; and "the more carefully they are examined, (says he,) the more certainly do they appear to be sepulchral stones, having epitaphs inscribed on them." The translator of Volney's Travels ascribes these inscriptions to the pilgrims who have visited Mount Sinai; but they ought surely to have been written in a language which somebody could understand; yet from the copies that have been taken of them by Dr. Pococke and others, it does not appear that they could be explained by any person. When Dr. Clayton, bishop of Clogher, visited this part of the world, about 1723, he expressed the greatest desire to have the matter concerning these written mountains ascertained, and even made an offer of £500 sterling to any literary person, who would undertake the journey, and endeavour to decipher the inscriptions; but no such person appeared.

The next object that rises in our view is MOUNT ATHOS,—a mountain of Chalcidia in Macedonia, equally celebrated in ancient and modern times. The ancients entertained extravagant notions concerning its height. Mela affirmed it to be so high as to reach above the clouds, which at that time might have been considered a bold assertion; and Martianus Capellinus says, that its elevation was six miles. It was a received opinion, that mount Athos was above the middle region of the air, and that it never rained upon or near its summit, because the ashes left on the altars there, were always found as they had been left, dry and unscattered.

The modern Greeks, struck with its singular situation, and the venerable appearance of its towering ascent, erected so many churches, monasteries, hermitages, &c. upon it, that it became in a manner inhabited by a company of religious devotees; and from thence received the name of Monte Santo, or the Holy Mountain; which appellation it still retains, though many of those consecrated buildings are now fallen into ruin and decay.

According to the accounts of modern travellers, this mountain advances into the Archipelago, on the south of the gulf of Contessa, and is joined to the continent by an isthmus about half a league in breadth. It is estimated to be thirty miles in circumference, and two in perpendicular height. It may be travelled over in about three days, and is to be seen at the great distance of ninety miles. There is a fine prospect from the top; but, like all other high mountains, the cold on its summit is excessive. It abounds with many different kinds of plants and trees, particularly the pine and fir. In the valleys grows a plant called *elegia*, whose branches serve to make pens for writing. In short, this mountain is said to be adorned with a variety of herbage and evergreens, a multi-

tude of springs and streams, with woods extending almost to the sea shore, which happy combination of circumstances renders it one of the most agreeable places in the world. There are twenty-four large old monasteries upon it, surrounded with high walls, and inhabited by Camoyers, a certain description of Greek monks.

Through this mountain, or rather through the isthmus behind it, Xerxes king of Persia is said to have cut a passage for his fleet, when about to invade Greece. In this arduous task he spent three whole years, and employed in it all the forces on board his fleet. He is also said, before the work begun, to have written the following ridiculous letter to the mountain: "Athos, thou proud and aspiring mountain, that liftest up thy head to the very skies, I advise thee not to be so audacious, as to put rocks and stones, that cannot be cut, in the way of my workmen. If thou makest that opposition, I will cut thee entirely down, and throw thee headlong into the sea!" The directors of this enterprise are said to have been Bubaris, the son of Megabysus, and Artacheus, the son of Arbeus, both Persians; but as no traces of such a great work remains, the truth of the whole relation has justly been questioned. This venerable mountain constitutes one entire chain, extending seven miles in length, and three in breadth, and is situated about seventy miles east of Salonichi, the ancient Thessalonica.

We will now accompany Sir George Mackenzie to THE SULPHUR MOUNTAINS, IN THE ISLAND OF ICELAND.—

"Having taken an early breakfast, (says he,) we set out towards the Sulphur Mountain, which is about three miles distant from Krisuvik. At the foot of the mountain was a small bank, composed chiefly of white clay mixed with sulphur, from all parts of which steam issued. Ascending it, we got upon a ridge immediately above a deep hollow, from which a profusion of vapour arose, and heard a confused noise of boiling and splashing, joined to the roaring of steam escaping from narrow crevices in the rock. This hollow, together with the whole side of the mountain opposite, as far up as we could see, was covered with sulphur and clay, chiefly of a white or yellowish colour. Walking over this soft and steaming surface, we found to be very hazardous, and we were frequently very uneasy when the vapour concealed us from each other.

"The day, however, being dry and warm, the surface was not so slippery as to occasion much risk of our falling. The danger of the crust of sulphur breaking, or of the clay sinking with us, was great; and we were several times in imminent peril of being scalded. Mr. Bright ran at one time a great hazard, and suffered considerable pain

from accidentally plunging one of his legs into the hot clay.

"From whatever spot the sulphur was removed, steam instantly escaped; and in many places, the sulphur was so hot that we could scarcely handle it. From the smell, we perceived that the steam was mixed with a small quantity of sulphuretted hydrogen gas. When the thermometer was sunk a few inches into the clay, it rose generally to within a few degrees of the boiling point. By stepping cautiously, and avoiding every little hole from which steam issued, we soon discovered how far we might venture. Our good fortune, however, ought not to tempt any person to examine this wonderful place, without being provided with two boards, with which every part of the banks may be traversed in perfect safety.

"At the bottom of this hollow, we found a caldron of boiling mud, about fifteen feet in diameter, similar to that on the top of the mountain, which we had seen the evening before; but this boiled with much more vehemence. We went within a few yards of it, the wind happening to be remarkably favourable for our viewing every part of this singular place. The mud was in constant agitation, and often thrown up to the height of six or eight feet. Near this spot was an irregular space, filled with water boiling briskly. At the foot of the hill, is a hollow formed by a bank of clay and sulphur, whence steam rushed with great force and noise from among the loose fragments of rock.

"Further up the mountain, we met with a spring of cold water, a circumstance little expected in a place like this. Ascending still higher, we came to a ridge composed entirely of sulphur and clay, joining two summits of the mountain. Here we found a much greater quantity of sulphur than on any other part of the surface, over which we had yet gone. It formed a smooth crust, from a quarter of an inch to several inches in thickness. The crust was beautifully crystallized, and immediately beneath it we found a quantity of loose granular sulphur, which appeared to be collecting and crystallizing, as it was sublimed along with the steam. Sometimes we met with clay of different colours, white, red, and blue, under the crust; but we could not examine this place to any depth, as, the moment the crust was removed, steam issued, and proved extremely annoying. We found several pieces of wood, which were probably the remains of planks that had been formerly used in collecting the sulphur, small crystals of which partially covered them.

"There appeared to be a constant sublimation of this substance; and were artificial chambers constructed for the reception and condensation of vapours, much of it might pro-

bably be collected. As it is, there is a large quantity on the surface; and, by searching, there is little doubt that great stores may be found. The inconvenience proceeding from the steam issuing on every side, and from the heat, is certainly considerable; but, by proper precautions, neither would be felt so much as to render the collection of the sulphur a matter of any great difficulty. The chief obstacle to working these mines, is their distance from a port whence the produce could be shipped. But there are so many horses in the country, whose original price is trifling, and whose maintenance during summer costs nothing, that the conveyance of sulphur to Reikiavik, presents no difficulties which might not probably be surmounted.

"Below the ridge on the farther side of this great bed of sulphur, we saw a great deal of vapour escaping with much noise. We crossed to the opposite side of the mountain, and found the surface sufficiently firm to admit of walking cautiously upon it. We had now to make our way towards the principal spring, as it is called; and this was a task of much apparent danger, as the side of the mountain, for the extent of about half a mile, is covered with loose clay, into which our feet sunk at every step. In many places there was a thin crust, below which the clay was wet, and extremely hot. Good fortune attended us; and without any serious inconvenience, we reached the object we had in view. A dense column of steam, mixed with a little water, was forcing its way impetuously through a crevice in the rock, at the head of a narrow valley, or break in the mountain. The violence with which it rushes out is so great, that the noise thus occasioned, may often be heard at the distance of several miles; and, during night, while lying in our tent at Krisuvik, we more than once listened to it with mingled emotions of awe and astonishment. Behind the column of vapour was a dark-coloured rock, which gave it its full effect.

"It is quite beyond our power to offer such a description of this extraordinary place, as to convey adequate ideas of its wonders or its terrors. The sensations of a person, even of firm nerves, standing on a support which feebly sustains him, over an abyss, where, literally, fire and brimstone are in dreadful and incessant action,—having before his eyes tremendous proofs of what is going on beneath him,—enveloped in thick vapours,—and his ears stunned with thundering noises—**must be experienced before they can be understood.**"

CHAP. XL.

CURIOSITIES RESPECTING MOUNTAINS.—(*Continued.*)

“So pleas’d at first the tow’ring mounts we try,
 Mount o’er the vales, and seem to tread the sky;
 Th’ eternal snows appear already past,
 And the first clouds and mountains seem the last.
 But, those attain’d, we tremble to survey
 The growing labours of the lengthen’d way;
 Th’ increasing prospect tires our wand’ring eyes,
 Hills peep o’er hills, and mounts on mounts arise.”

MONT BLANC, IN SAVOY.

NARRATIVE of a Journey from the village of Chamouni, to the summit of Mont Blanc, undertaken on August 8, 1787; by Colonel Beaufoy. *From the Annals of Philosophy.*—

“The desire of ascending to the highest part of remarkably elevated land is so natural to every man, and the hope of repeating various experiments in the upper regions of the air is so inviting to those who wish well to the interests of science, that, being lately in Switzerland, I could not resist the inclination I felt to reach the summit of Mont Blanc. One of the motives, however, which prompted the attempt, was much weakened by the consideration that I did not possess, and in that country could not obtain, the instruments that were requisite for many of the experiments which I was anxious to make; and the ardour of uncommon curiosity was diminished, when I learned that Dr. Paecard and his guide, who in the year 1786 had reached the supposed inaccessible summit of the hill, were not the only persons who had succeeded in the attempt; for that, five days before my arrival at the foot of the mountain, M. de Saussure, a professor in the university of Geneva, had gained the top of the ascent.

“But while I was informed of the success which had attended the efforts of M. de Saussure, I was told of the difficulties and dangers that accompanied the undertaking; and was often assured, with much laborious dissuasion, that, to all the usual obstacles, the lateness of the season would add the perils of those stupendous masses of snow which are often dislodged from the steep slopes of the mountain, together with the hazard of those frightful chasms which present immeasurable gulfs to the steps of the traveller, and the width of which was hourly increasing. M. Bourrèt, whose name has often been announced to the world by a variety of tracts, and by many excellent drawings, confirmed the account, and assured me that he himself had made the attempt on the next day to that

on which M. de Saussure descended, but was obliged, as on many former occasions, to abandon the enterprise. Having, however, formed my resolution, I sent to the different cottages of the vale of Chamouni, from the skirts of which the mountain takes its rise, to inquire if any of them were willing to go with me as my assistants and guides; and had soon the satisfaction to find that ten were ready to accept the proposal. I engaged them all. Having announced to them my intention of setting out the next morning, I divided among them provisions for three days, together with a kettle, a chafing-dish, a quantity of charcoal, a pair of bellows, a couple of blankets, a long rope, a hatchet, and a ladder, which formed the stores that were requisite for the journey. After a night of much solicitude, lest the summit of Mont Blanc should be covered with clouds, in which case the guides would have refused the undertaking as impracticable, I rose at five in the morning, and saw, with great satisfaction, that the mountain was free from vapour, and that the sky was every where serene. My dress was a white flannel jacket, without any shirt beneath, and white linen trowsers, without drawers. The dress was white, that the sunbeams might be thrown off; and it was loose, that the limbs might be unconfined. Besides a pole for walking, I carried with me cramp-irons for the heels of my shoes, by means of which the hold on the frozen snow is firm, and in steep ascents the poise of the body is preserved.

"My guides being at length assembled, each with his allotted burden; one of them, a fellow of great bodily strength and vigour of mind, Michael Cachet by name, who had accompanied M. de Saussure, desired to take the lead. We ranged ourselves in a line, and at seven o'clock, in the midst of the wives, and children, and friends, of my companions, and indeed of the whole village of Chamouni, we began our march. The end of the first hour brought us to the Glacier des Boissons, at which place the rapid ascent of the mountain first begins, and from which, pursuing our course along the edge of the rocks that form the eastern side of this frozen lake, we arrived in four hours more at the second glacier, called the Glacier de la Coté. Here, by the side of a stream of water which the melting of the snow had formed, we sat down to a short repast.

"To this place the journey is neither remarkably laborious, nor exposed to danger, except that name should be given to the trifling hazard that arises from the stones and loose pieces of the broken rock, which the goats, in leaping from one projection to another, occasionally throw down. Our dinner being finished, we fixed our cramp-irons to our shoes, and began to cross the glacier; but we had not proceeded far,

when we discovered that the frozen snow, which lay in the ridges between the waves of ice, often concealed, with a covering of uncertain strength, the fathomless chasms which traverse this solid sea; yet the danger was soon in a great degree removed by the expedient of tying ourselves together with our long rope, which being fastened at proper distances to our waists, secured from the principal hazard such as might fall within the opening of the gulf. Trusting to the same precaution, we also crossed upon our ladder, without apprehension, such of the chasms as were exposed to view; and, sometimes stopping in the middle of the ladder, looked down in safety upon an abyss which baffled the reach of vision, and from which the sound of the masses of ice that we repeatedly let fall, in no instance ascended to the ear. In some places we were obliged to cut foot-steps with our hatchet; yet, on the whole, the difficulties were far from great, for in two hours and a half we had passed the glacier.

"We now, with more ease, and much more expedition, pursued our way, having only snow to cross, and in two hours arrived at a hut which had been erected in the year 1786, by the order, and at the expense, of M. de Saussure. The hut was situated on the eastern side of a rock, which had all the appearance of being rotten with age, and which in fact was in a state of such complete decay, that on my return the next evening, I saw scattered on the snow many tons of its fragments, which had fallen in my absence; but the ruin was not on the side on which the hut was built. Immediately on our arrival, which was at five in the afternoon, the guides began to empty the hut of its snow, and at seven we sat down to eat; but our stomachs had little relish for food, and felt a particular distaste for wine and spirits. Water, which we obtained by melting snow in a kettle, was the only palatable drink. Some of the guides complained of a heavy disheartening sickness; and my Swiss servant, who had accompanied me at his own request, was seized with excessive vomiting, and the pains of the severest headach. But from these complaints, which apparently arose from the extreme lightness of the air in those elevated regions, I myself and some of the guides were free, except, as before observed, that we had little appetite for food, and a strong aversion to the taste of spirituous liquors. We now prepared for rest; on which two of the guides, preferring the open air, threw themselves down at the entrance of the hut, and slept upon the rock. I too was desirous of sleep; but my thoughts were troubled with the apprehension that, although I had now completed one half of the road, the vapours might collect on the summit of the mountain, and frustrate all my hopes. Or if at any time the rest I wished for came, my repose was soon disturbed by

the noise of the masses of snow, which were loosened by the wind from the heights around me, and which, accumulating in bulk as they rolled, tumbled at length from the precipices into the vales below, and produced upon the ear the effect of redoubled bursts of thunder.

"At two o'clock I threw aside my blankets, and went out of the hut to observe the appearance of the heavens. The stars shone with a lustre that far exceeded the brightness which they exhibit when seen from the usual level; and had so little tremor in their light, as to leave no doubt on my mind, that, if viewed from the summit of the mountain, they would have appeared as fixed points. How improved in those altitudes would be the aids which the telescope gives to vision! indeed, the clearness of the air was such as led me to think that Jupiter's satellites might be distinguished by the naked eye; and had he not been in the neighbourhood of the moon, I might possibly have succeeded. He continued distinctly visible for several hours after the sun was risen, and did not wholly disappear till almost eight.

"At the time I rose, my thermometer, which was on Fahrenheit's scale, and which I had hung on the side of the rock without the hut, was 8° below the freezing point. Impatient to proceed, and having ordered a large quantity of snow to be melted, I filled a small cask with water for my own use, and at three o'clock we left the hut. Our route was across the snow; but the chasms which the ice beneath had formed, though less numerous than those that we had passed on the preceding day, embarrassed our ascent. One in particular had opened so much in the few days that intervened between M. de Saussure's expedition and our own, as for the time to bar the hope of any further progress; but at length, after having wandered with much anxiety along its bank, I found a place which I hoped the ladder was sufficiently long to cross. The ladder was accordingly laid down, and was seen to rest upon the opposite edge, but its bearing did not exceed an inch on either side. We now considered that, should we pass the chasm, and should its opening, which had enlarged so much in the course of a few preceding days, increase in the least degree before the time of our descent, no chance of return remained. We also considered that, if the clouds, which so often envelop the hill should rise, the hope of finding, amidst the thick fog, our way back to this only place in which the gulf, even in its present state, was passable, was little less than desperate. Yet, after a moment's pause, the guides consented to go with me, and we crossed the chasm.

"We had not proceeded far, when thirst, which, since our arrival in the upper regions of the air, had been always tron-

blesome, became almost intolerable. No sooner had I drank than the thirst returned, and in a few minutes my throat became perfectly dry. Again I had recourse to the water, and again my throat was parched. The air itself was thirsty; its extreme of dryness had robbed my body of its moisture. The guides were equally affected: wine they would not taste, but the moment my back was turned, their mouths were equally applied to my cask of water. Yet we continued to proceed till seven o'clock, when, having passed the place where M. de Saussure, who was provided with a tent, had slept the second night, we sat down to breakfast.

"All this time the thermometer was 4° below the freezing point. We were now at the foot of Mont Blanc itself; for, though it is usual to apply that term to the whole assemblage of several successive mountains, yet the name properly belongs only to a small mountain of a pyramidal form, that rises from a narrow plain, which at all times is covered with snow. Here the thinness of the atmosphere began to affect my head with a dull and heavy pain. I also found, to my great surprise, an acute sensation of pain, very different from that of weariness, immediately above my knees. Having finished our repast, we pursued our journey, and soon arrived at a chasm which could not have existed many days, for it was not formed at the time of M. de Saussure's ascent. Misled by this last circumstance, (for we concluded, that as he had seen no rents whatever from the time that he passed the place where he slept the second night, none were likely to be formed,) we had left our ladder about a league behind; but as the chasm was far from wide, we passed it on the poles that we used for walking, an expedient which suggested to me that the length of our ladder might be easily increased by the addition of several poles laid parallel, and fastened to its end; and that the hazard of finding our retreat cut off from the enlargement of the chasms, might by this means be materially diminished.

"At this place I had an opportunity of measuring the height of the snow which had fallen during the preceding winter, and which was distinguished by its superior whiteness from that of the former year. I found it to be five feet. The snow of each particular year appeared as a separate stratum; that which was more than a twelvemonth old, was perfect ice, while that of the last winter was fast approaching to a similar state. At length, after a difficult ascent, which lay among precipices, and during which we were often obliged to employ the hatchet in making a footing for our feet, we reached, and reposed ourselves upon, a narrow flat, which is the last of three from the foot of the small mountain, and which, according to M. de Saussure, is but 150 fathoms below the level of the

summit. Upon this platform I found a beautiful dead butterfly, the only appearance which, from the time I entered on the snow, I had seen of any animal. The pernicious effects of the thinness of the air were now evident on us all; a desire, of sleep, almost irresistible, came on; my spirits had left me: sometimes indifferent to the event, I wished to lie down; at others, I blamed myself for the expedition; and, though just at the summit, had thoughts of turning back, without accomplishing my purpose. Of my guides, many were in a worse situation; for, exhausted by excessive vomiting, they seemed to have lost all strength, both of mind and body.

“But shame at length came to our relief. I drank the last pint of water that was left, and found myself amazingly refreshed, and invigorated for renewed toil. Yet the pain in my knees had increased so much, that at the end of every twenty or thirty paces I was obliged to rest till its sharpness was abated. My lungs with difficulty performed their office, and my heart was affected with violent palpitation. At last, however, but with a sort of apathy which scarcely admitted the sense of joy, we reached the summit of this mountain; when six of our guides, and with them my servant, threw themselves on their faces, and were immediately asleep. I envied them their repose, but my anxiety to obtain a good observation for the latitude subdued my wishes for indulgence. The time of my arrival was half an hour after ten, so that the hours which elapsed from our departure from Chamouni, were only twenty-seven and a half, ten of which we had passed in the hut. The summit of the hill is formed of snow, which spreads into a sort of plain, which is much wider from east to west than from north to south, and in its greatest width is perhaps thirty yards. The snow is every where hard, and in many places is covered with a sheet of ice.

“When the spectator begins to look around him from this elevated height, a confused impression of immensity is the first effect produced upon his mind; but the blue colour of the canopy above him, deep almost to blackness, soon arrests his attention. He next surveys the mountains, many of which, from the clearness of the air, are to his eye within a stone's throw from him; and even those of Lombardy (one of which appears of an altitude but little inferior to that of Mont Blanc) seem to approach his neighbourhood; while those on the other side of the vale of Chamouni, glittering with the sunbeams, are to the view directly below his feet, and affect his head with giddiness. On the other hand, all objects, of which the distance is great, and the level low, are hid from his eye by the blue vapour which intervenes, and through which I could not discern the Lake of Geneva, (at the height of 15,700 English feet, which, according to M. de Saussure, was

the level on which I stood,) though even the Mediterranean Sea must have been within the line of vision. The air was still, and the day so remarkably fine, that I could not discover in any part of the heavens the appearance of a single cloud.

"As the time of the sun passing the meridian now approached, I prepared to take my observation. I had with me an admirable Hadley's sextant, and an artificial horizon, and I corrected the mean refraction of the sun's rays. Thus I was enabled to ascertain with accuracy, that the latitude of the summit of Mont Blanc is $45^{\circ} 49' 59''$ north.

"I now proceeded to such other observations as the few instruments which I had brought permitted me to make. At twelve o'clock the mercury in the thermometer stood at 38° in the shade; at Chamouni, at the same hour, it stood, when in the shade, at 78° . I tried the effect of a burning-glass on paper, and on a piece of wood, which I had brought with me for the purpose, and found (contrary, I believe, to the generally received opinion,) that its power was much greater than in the lower regions of the air. Having continued two hours on the summit of the mountain, I began my descent at half an hour after twelve. I found that, short as my absence had been, many new rents were opened, and that several of those which I had passed in my ascent were considerably wider. In less than six hours we arrived at the hut in which we had slept the evening before, and should have proceeded much further down the mountain, had we not been afraid of passing the Glacier de la Coté at the close of the day, when the snow, from the effect of the sunbeams, was extremely rotten. Our evening's repast being finished, I was soon asleep; but in a few hours I was awakened with a tormenting pain in my face and eyes. My face was one continued blister, and my eyes I was unable to open; nor was I without apprehensions of losing my sight for ever, till my guides told me, that if I had condescended to have taken their advice, of wearing, as they did, a mask of black crape, the accident would not have befallen me, but that a few days would perfectly restore the use of my eyes. After I had bathed them with warm water for half an hour, I found, to my great satisfaction, that I could open them a little; on which I determined upon an instant departure, that I might cross the Glacier de la Coté before the sun was sufficiently high for its beams to be strongly reflected from the snow. But, unluckily, the sun was already above the horizon; so that the pain of forcing open my eyes in the bright sunshine, in order to avoid the chasms and other hazards of my way, rendered my return more irksome than my ascent. Fortunately, one of the guides, soon after I had passed the glacier, picked up in the snow a pair of green

spectacles, which M. Bourret had lost, and which gave me wonderful relief.

“At eleven o'clock of August 10, after an absence of fifty-two hours, of which twenty were passed in the hut, I returned again to the village of Chamouni. From the want of instruments, (the scale of the barometer I had being graduated no lower than twenty inches, which was not sufficiently extended,) the observations I made were but few, yet the effects which the air in the heights I visited produced on the human body, may not perhaps be considered as altogether uninteresting; nor will the proof I made of the power of the lens on the summit of Mont Blanc, if confirmed by future experiments, be regarded as of no account in the theories of light and heat. At any rate, the having determined the latitude of Mont Blanc may assist in some particulars the observations of such persons as shall visit it in future; and the knowledge which my journey has afforded, in addition to that which is furnished by M. de Saussure, may facilitate the ascent of those who, with proper instruments, may wish to make on that elevated level, experiments in natural philosophy.”



CHAP. XLI.

CURIOSITIES RESPECTING MOUNTAINS.—(*Concluded.*)

VOLCANIC MOUNTAINS.

Description of Vesuvius—Hecla—Etna.

———— The fluid lake that works below,
 Bitumen, sulphur, salt, and iron scum,
 Heaves up its boiling tide. The lab'ring mount
 Is torn with agonizing throes. At once,
 Forth from its side disparted, blazing, pours
 A mighty river, burning in prone waves,
 That glimmer thro' the night, to yonder plain.
 Divided there, a hundred torrent streams,
 Each ploughing up its bed, roll dreadful on,
 Resistless. Villages, and woods, and rocks,
 Fall flat before their sweep. The region round,
 Where myrtle walks, and groves of golden fruit
 Rose fair, where harvest wav'd in all its pride,
 And where the vineyard spread its purple store,
 Maturing into nectar,—now despoil'd
 Of herb, leaf, fruit, and flow'r, from end to end
 Lies buried under fire, a glowing sea! *Mallet.*

VESUVIUS,—is a celebrated volcano of Italy, six miles east of Naples. This mountain has two tops; one only of which goes by the name of Vesuvius, the other being now

called Somma; but Sir William Hamilton is of opinion, that the latter is what the ancients called Vesuvius.

The perpendicular height of Vesuvius is only three thousand seven hundred feet, though the ascent from the foot to the top is three Italian miles. One side of the mountain is well cultivated and fertile; producing great plenty of vines; but the south and west sides are entirely covered with cinders and ashes, while a sulphureous smoke constantly issues from the top, sometimes attended with the most violent explosions of stones, the emission of great streams of lava, and all the other attendants of a most formidable volcano.

The first eruption recorded in history, took place in the year 79; at which time the two cities of Pompeii and Herculaneum were entirely buried under the stones and ashes thrown out. Incredible mischief was also done to the neighbouring country, and numbers of people lost their lives, among whom was Pliny the elder. It is the opinion of the best judges, however, that this eruption was by no means the first that had ever happened: the very streets of those cities which were at that time overwhelmed, are unquestionably paved with lava. Since that time thirty different eruptions have been recorded, some of which have been extremely violent. In 1538, a mountain three miles in circumference, and a quarter of a mile in perpendicular height, was thrown up in the course of one night.

In 1766, Sir William Hamilton began to observe the phenomena of this mountain; and since that time the public have been favoured with more exact and authentic accounts of the various changes which have taken place in Vesuvius, than were to be obtained before. The first great eruption taken notice of by this gentleman was that of 1769, when Vesuvius never ceased for ten years to send forth smoke, nor were there many months in which it did not throw out stones, scorïæ, and cinders, which increasing to a certain degree, were usually followed by lava; so that from the year 1767 to 1769 there were nine eruptions, some of which were very considerable.

In the month of August that year, an eruption took place, which, for its extraordinary and terrible appearance, may be reckoned among the most remarkable of any recorded concerning this or any other volcano. During the whole of July, the mountain continued in a state of fermentation. Subterraneous explosions and rumbling noises were heard; quantities of smoke were thrown up with great violence, sometimes with red-hot stones, scorïæ, and ashes; and towards the end of the month, these symptoms increased to such a degree, as to exhibit, in the night, the most beautiful fireworks.

On Thursday the fifth of August, the volcano appeared most

violently agitated: a white and sulphureous smoke issued with unceasing impetuosity from its crater, one puff seeming to impel another; so that a mass of vapour was soon accumulated, to all appearance, four times the height and size of the volcano itself. These clouds of smoke were exceedingly white, resembling an immense accumulation of bales of the whitest cotton. In the midst of this very white smoke, vast quantities of stones, scoriæ, and ashes, were thrown up to the height of two thousand feet; and a quantity of liquid lava, seemingly very heavy, was lifted up just high enough to clear the rim of the crater, and take its way down the sides of the mountain. This lava, having run violently for some hours, suddenly ceased, just before it had reached the cultivated parts of the mountain, near four miles from the spot whence it issued.

The heat, all this day, was intolerable at the towns of Somma and Ottaiano; and was sensibly felt at Palma and Lauri, which are much farther off. Reddish ashes fell so thick on the two former, that the air was darkened to such a degree, that objects could not be distinguished at the distance of ten feet. Long filaments of a vitrified matter, like spunglass, were mixed, and fell with these ashes; several birds in cages were suffocated; and the leaves of the trees in the neighbourhood of Somma were covered with white and very corrosive salt. About twelve at night, on the seventh, the fermentation of the mountain seemed greatly to increase. Our author was watching the motions of the volcano from the mole at Naples, which has a full view of it. Several awfully fine and picturesque effects had been observed from the reflection of the deep red fire within the crater of Vesuvius, and which mounted high amongst those huge clouds on the top of it; when a summer storm, called in that country a *tropea*, came on suddenly, and blended its heavy watery clouds with the sulphureous and mineral ones, which were already, like so many other mountains, piled up on the top of the volcano. At this moment, a fountain of fire was shot up to an incredible height, casting so bright a light, that the smallest objects were clearly distinguishable at any place within six miles or more of Vesuvius. The black stormy clouds, passing swiftly over, and at times covering the whole or part of the bright column of fire, at other times clearing away and giving a full view of it, with the various tints produced by its reverberated light on the white clouds above, in contrast with the pale flashes of forked lightning that attended the *tropea*, formed such a scene, as no combination of language can express. One of the king's gamekeepers, who was out in the fields near Ottaiano while this storm was at its height, was surprised to find the drops of rain scald his face and hands; a

phenomenon probably occasioned by the clouds having acquired a great degree of heat in passing through the above-mentioned column of fire.

On the eighth, the mountain was quiet till towards six P. M. when a great smoke began to gather over its crater; and about an hour after, a rumbling subterraneous noise was heard in the neighbourhood of the volcano; the usual throws of red-hot stones and scoriæ began and increased every instant. The crater, viewed through a telescope, seemed much enlarged by the violence of the explosions on the preceding night; and the little mountain on the top was entirely gone. About nine, a most violent report was heard at Portici and its neighbourhood, which shook the houses to such a degree as made the inhabitants run out into the streets. Many windows were broken, and walls cracked, by the concussion of the air on this occasion, though the noise was but faintly heard at Naples. In an instant, a fountain of liquid transparent fire began to rise, and, gradually increasing, arrived at last to the amazing height of ten thousand feet and upwards. Puffs of smoke, as black as can possibly be imagined, rapidly succeeded one another, and, accompanying the red-hot transparent and liquid lava, interrupted its splendid brightness here and there by patches of the darkest hue. Within these puffs of smoke, at the very moment of emission, a bright but pale electrical fire was observed playing briskly about in zig-zag lines. The wind was south-west, and, though gentle, was sufficient to carry these puffs of smoke out of the column of fire, and a collection of them by degrees formed a black and extensive curtain behind it; in other parts of the sky it was perfectly clear, and the stars bright. A fiery fountain of such immense magnitude, on the dark ground just mentioned, made the finest contrast imaginable; and the blaze of it, reflected from the surface of the sea, which was at that time perfectly smooth, added greatly to this sublime spectacle. The lava, mixed with stones and scoriæ, having risen to the amazing height already mentioned, was partly directed by the wind towards Ottaiano, and partly falling, still red-hot and liquid, upon the top of Vesuvius, covered its whole cone, as well as that of the summit of Somma, and the valley between them.

The falling matter being nearly as inflamed and vivid as that which was continually issuing fresh from the crater, formed with it one complete body of fire, which could not be less than two miles and a half in breadth, and of the extraordinary height above mentioned, casting a heat to the distance of at least six miles round. The brushwood on the mountain of Somma was soon in a blaze; and the flame of it being of a different colour, from the deep red of the matter thrown out by the

volcano, and from the silvery blue of the electrical fire, still added to the contrast of this most extraordinary scene. The black cloud increasing greatly, spread over Naples, and threatened the city with speedy destruction; for it was charged with electrical fire, which kept constantly darting about in bright zigzag lines. This fire, however, rarely quitted the cloud, but usually returned to the great column of fire whence it proceeded; though once or twice it was seen to fall on the top of Somma, and set fire to some dry grass and bushes. Fortunately, the wind carried back the cloud just as it reached the city, and had begun to occasion great alarm. The column of fire, however, still continued, and diffused such a strong light, that the most minute objects could be discerned at the distance of ten miles or more from the mountain. Mr. Morris informed our author, that at Sorrento, which is twelve miles distant from Vesuvius, he read the title page of a book by that volcanic light.

All this time the miserable inhabitants of Ottaiano were involved in the utmost distress and danger by the showers of stones which fell upon them, and which, had the eruption continued for a longer time, would most certainly have reduced their town to the same situation with Herculaneum and Pompeii.

The mountain of Somma, at the foot of which the town of Ottaiano is situated, hides Vesuvius from the view of its inhabitants; so that till the eruption became considerable, it was not visible to them. On Sunday night, when the noise increased, and the fire began to appear above the mountain of Somma, many of the inhabitants flew to the churches, and others were preparing to quit the town, when a sudden and violent report was heard; soon after which, they found themselves involved in a thick cloud of smoke and ashes, a horrid clashing noise was heard in the air, and presently fell a vast shower of stones and large pieces of scorixæ, some of which were of the diameter of seven or eight feet, which must have weighed more than 100lbs. before they were broken, as some of the fragments which Sir William Hamilton found in the streets still weighed upwards of 60lbs. When these large vitrified masses either struck against one another in the air, or fell on the ground, vivid sparks of fire proceeded from them, which communicated to every thing that was combustible. These masses were formed of the liquid lava; the exterior parts of which were become black and porous, by cooling in their fall through such a vast space; whilst the interior parts, less exposed, retained an extreme heat, and were perfectly red. In an instant, the town and country about it were on fire in many parts, for there were several straw huts in the vineyards, which had been erected for the watchmen of the grapes, all

of which were burnt to the ground. A great magazine of wood in the heart of the town became one sheet of fire; and had there been much wind, the flames must have spread universally, and the inhabitants have perished in their houses; for it was impossible for them to make their escape by flight. Some, who attempted it with pillows, tables, chairs, the tops of wine casks, &c. on their heads, were either knocked down by the falling masses, or soon driven to make a speedy retreat under arches, and in the cellars of their houses. Many were wounded, but only two persons died of their wounds. To add to the horror of the scene, incessant volcanic lightning was darting its coruscations about the black cloud that surrounded the inhabitants, and the sulphureous smell and heat would scarcely allow them to draw their breath.

In this dreadful situation they remained about twenty-five minutes, when the volcanic storm ceased all at once, and Vesuvius assumed a sullen silence. Sometime after the eruption had ceased, the air continued greatly impregnated with electrical matter. The duke of Cottosiano told our author, that having, about half an hour after the great eruption had ceased, held a leaden bottle, armed with a pointed wire, out at his window at Naples, it soon became considerably charged: but whilst the eruption was in force, its appearance was too alarming to allow any one to think of such experiments. He was informed also by the prince of Monte Mileto, that his son, the duke of Populi, who was at Monte Mileto on the 8th of August, had been alarmed by a shower of cinders that fell there, some of which he had sent to Naples, weighing two ounces; and that stones of an ounce weight had fallen upon an estate of his, ten miles farther off. Monte Mileto is about thirty miles from the volcano. The Abbé Cagliani also related, that his sister, a nun in a convent at Manfredonia, had written to inquire after him, imagining that Naples must have been destroyed, when they, at so great a distance, had been so much alarmed by a shower of ashes which fell on the city at eleven p. m. as to open all the churches, and go to prayers. As the great eruption began at nine, these ashes must have travelled 100 miles in two hours.

Nothing could be more dismal than the appearance of Ottaviano after this eruption. Many of the houses were unroofed, and some lay half buried under the black scorix and ashes; all the windows toward the mountain were broken, and some of the houses themselves burnt; the streets were choked up with ashes, and in some narrow places it was not less than four feet deep. A few of the inhabitants, who had just returned were employed in clearing them away, and piling them up in hillocks, to get at their ruined houses.

The palace of the prince of Ottaviano is situated on an emi-

nence above the town, and nearer the mountain. The steps leading up to it were deeply covered with volcanic matter; the roof was totally destroyed, and the windows broken; but the house itself being strongly built, had not suffered much dilapidation. An incredible number of fragments of lava were thrown out during the eruption, some of which were of immense magnitude. The largest measured by Sir William Hamilton was 108 feet in circumference, and seventeen in height: this was thrown at least a quarter of a mile clear of the mouth of the volcano. Another, sixty-six feet in circumference, and nineteen in height, being nearly of a spherical figure, was thrown out at the same time, and fell near the former: this last had all the marks of being rounded, nay, almost polished, by continual exposure to rolling torrents, or the still rougher beat of a sea-shore. Our author conjectures that it might be a spherical volcanic salt, such as that of forty-five feet in circumference mentioned by M. de St. Fond, in his Treatise on Extinguished Volcanoes. A third, of sixteen feet in height, and ninety-two in circumference, was carried much farther, and lay in the valley between Vesuvius and the Hermitage: it appeared, also, from the large fragments that surrounded this mass, that it had been much larger while in the air.

Vesuvius continued to emit smoke for a considerable time after this great eruption, so that our author was apprehensive that another would soon ensue; but from that time nothing comparable to the above has taken place. From the period of this great eruption, to 1786, our informant kept an exact diary of the operations of Vesuvius, with drawings; which shewed, by the comparative quantity of smoke emitted each time, the degree of fermentation within the volcano. The operations of these subterraneous fires, however, appear to be very capricious and uncertain: one day there will be the appearance of a violent fermentation, and the next every thing will be calmed; but whenever there has been a considerable ejection of scorïæ and cinders, it has been constantly observed, that the lava soon made its appearance, either by boiling over the crater, or forcing its way through the crevices in the conical part of the mountain.

In the year 1794, there was a very tremendous eruption, and the mischief done was very considerable: the lava covered and totally destroyed 5000 acres of rich vineyards and cultivated land, and drove the inhabitants of Torre del Greco from the town, a great part of the houses being either buried, or so injured as to be uninhabitable; the damage done in the vineyards by the ashes was also immense. Eruptions of this volcano also took place in 1804 and 1805; but this article will conclude by noticing only the eruption that happened on

the evening of the 31st of May, 1806, when a bright flame rose from the mountain to the height of about 600 feet, sinking and rising alternately, and affording so clear a light, that a letter might have been read at the distance of a league round the mountain. On the following morning, without any earthquake preceding, as had been customary, the volcano began to eject inflamed substances from three new mouths, pretty near to each other, and about 650 feet from the summit. The lava took the direction of Torre del Greco and Annunciata, approaching Portici on the road leading from Naples to Pompeii.

Throughout the whole of the 2d of June, a noise was heard, resembling that of two armies engaged, when the discharges of artillery and musketry are very brisk. The current of lava now resembled a wall of glass in a state of fusion; sparks and flashes issuing from it from time to time with a powerful detonation. Vines, trees, houses, in short, whatever objects it encountered on its way, were instantly overthrown and destroyed. In one part, where it met with the resistance of a wall, it formed a cascade of fire. In a few days, Portici, Resina, and Torre del Greco, were covered with ashes thrown out by the volcano; and on the 9th, the two former places were deluged with a thick black rain, consisting of a species of mud, filled with sulphureous particles.

On the 1st of July, the ancient crater had wholly disappeared, being filled with ashes and lava; and a new one was formed in the eastern part of the mountain, about 600 feet in depth, and having about the same width at the opening. Several persons, on the above day, descended about half way down this new mouth, and remained half an hour very near the flames, admiring the spectacle presented by the liquid lava, which bubbled up at the bottom of the crater, like the fused matter in a glasshouse. This eruption continued until September, made great ravages, and was considered as one of the most terrible that occurred within the memory of the oldest inhabitants. Sir William Hamilton observes, that the inhabitants of Naples, in general, pay so little attention to the operations of this volcano, that many of its eruptions pass unnoticed by at least two-thirds of them. It is remarkable to observe, with what readiness and *sang froid* they inhabit the towns and villas on the brow of the mountain, and how quickly they return to spots which have suffered the most severely. The inhabitants are not much alarmed by a stream of lava, which moves slowly, from which they can always remove, and carry off their moveable property; their greatest danger consists in the clouds of burning ashes, which fly to a great distance, and the fall of which can neither be anticipated nor avoided.

MOUNT HECLA.—This is a volcano of Iceland, and one of those whose operations are the most powerful of any in the world. It was visited in 1722, by Dr. Van Troil, a Swedish gentleman, together with Mr. (afterwards Sir Joseph) Banks, Dr. Solander, and Dr. James Lind, of Edinburgh. On their first landing, they found a tract of land sixty or seventy miles in extent, entirely ruined by lava, which appeared to have been in the highest state of liquefaction. Having undertaken a journey to the top of the mountain, they travelled from 300 to 360 English miles, over an uninterrupted tract of lava, and had at length the pleasure of being the first who had arrived at the summit of the mountain.

Hecla, according to their accounts, is situated in the south part of the island, about four miles from the sea coast; and is divided into three parts at the top, the middle point being the highest. From an exact observation with Ramsden's barometer, it is 5000 feet above the level of the sea. They were obliged to quit their horses at the first opening from which the fire had burst. They describe this as a place with lofty walls and high glazed cliffs, unlike any thing which they had ever seen before. A little higher up they found a large quantity of grit and stones; and still farther, another opening, which, though not deep, descended lower than that of the highest point. Here, they imagined, they plainly discerned the effects of boiling water; though not far from thence the mountain was covered with snow, excepting some spots, which difference they perceived to be occasioned by the hot vapour issuing from the crevices in the mountain. As they ascended towards the top, they found the spots become larger; and about 200 yards below the summit, a hole about a yard and a half in diameter was observed, whence issued so hot a steam, that they could not measure the degree of heat with the thermometer.

The cold began now to be very intense; Fahrenheit's thermometer, which at the foot of the mountain was at fifty-four, now fell to twenty-four; the wind also became so violent, that they were sometimes obliged to lie down, for fear of being blown down the most dreadful precipices. On the very summit, they experienced at the same time a high degree of heat and of cold; for, in the air, Fahrenheit's thermometer stood constantly at twenty-four, but when set on the ground, rose to 153; the barometer stood at 22.247. Though they wished very much to remain here for some time, they found that they could not effect their purpose with safety; they therefore descended quickly.

The mountain seems to be made up, not of lava, but of sand, grit, and ashes; which are thrown up with discoloured stones, partly melted by the fire. Several sorts of pumice

stones were found on it, among which was one with some sulphur. Sometimes the pumice was so much burnt, that it was as light as tow. Its form and colour were sometimes very fine, but at the same time so soft, that it was difficult to remove it from one place to another. The common lava was found in both large and small pieces; as well as a quantity of black jasper, burned at the extremities, and resembling trees and branches. Some slate, of a strong red colour, was observed among the stones thrown out by the volcano. In one place the lava had taken the form of chimney-stacks half broken down.

As they descended the mountain, they observed three openings. In one, every thing looked as red as brick; from another, the lava had flowed in a stream about fifty yards broad, and, after proceeding some length, had divided into three large branches. Further on they perceived an opening, at the bottom of which was a mount in form of a sugar loaf; in throwing up of which, the fire appeared to have exhausted itself. The reason that no one before them had ever ascended to the top of this mountain, was partly owing to superstition, and partly to the steepness and difficulty of the ascent, which was in a great measure removed by an eruption in 1766.

We now proceed to describe the celebrated MOUNT ETNA.—

Now Etna roars with dreadful ruins nigh,
 Now hurls a bursting cloud of cinders high, }
 Involv'd in smoky whirlwinds to the sky;
 With loud dislosion to the starry frame,
 Shoots fiery globes and furious floods of flame;
 Now from her bellowing caverns burst away
 Vast piles of melted rocks in open day.
 Her shatter'd entrails wide the mountain throws,
 And deep as hell her flaming centre glows. *Warton.*

Etna is a famous volcanic or burning mountain in Sicily, situated on the eastern coast, not far from Catania. The height of this mountain is more than 10,000 feet above the level of the sea, and its circumference at the base is 180 miles. Over its sides are seventy-seven cities, towns, and villages, the number of the inhabitants of which is about 115,000. From Catania to the summit, the distance is thirty miles; and the traveller must pass through three distinct climates, which may be denominated the torrid, the temperate, and the frigid. Accordingly, the whole mountain is divided into three distinct regions, called the fertile, the woody, and the barren.

The first, or lowest region, extends through a beautiful ascent from twelve to eighteen miles. The city of Catania, and several villages, are situated in this first zone, and it abounds in pastures, orchards, and various kinds of fruit trees

Its great fertility is ascribed to the decomposition of lava, and of those vegetables which have been introduced by the arts of agriculture, and the exertions of human industry. The figs and fruit in general, in this part, are reckoned the finest in Sicily. The lava of this region flows from a number of small mountains, which are dispersed over the immense declivity of Etna.

The woody region, or temperate zone, extends from eight to ten miles in a direct line, towards the top of the mountain; and comprehends a surface of about forty or forty-five square leagues. It forms a zone of the brightest green all around the mountain, which exhibits a pleasing contrast to its white and hoary summits. It is called the woody region, because it abounds with oaks, beeches, and firs. The soil is similar to that of the lower region; the air is cool and refreshing, and every breeze is loaded with a thousand perfumes, the whole ground being covered over with the richest aromatic plants. Many parts of this space are the most heavenly spots upon earth; and if Etna resemble Hell within, it may with equal justice be said to resemble Paradise without.

The upper region, called the frigid zone, is marked out by a circle of snow and ice. The surface of this zone is for the most part flat and even, and the approach to it is indicated by the decline of vegetation, by uncovered rocks of lava and heaps of sand, by near views of an expanse of snow and ice, as well as of torrents of smoke issuing from the crater of the mountain, and by the difficulty and danger of advancing amidst streams of melted snow, sheets of ice, and gusts of chilling wind. The curious traveller, however, thinks himself amply recompensed, upon gaining the summit, for the peril which he has encountered. At night, the number of stars seem increased, and their light appears brighter than usual. The lustre of the milky-way is like a pure flame, that shoots across the heavens, and with the naked eye we may observe clusters of stars totally invisible in the lower regions.

Dr. Woodward mentions the existence of volcanoes as a special favour of Providence, and says, "There are scarcely any countries, that are much annoyed with earthquakes, that have not one of these fiery vents. And these are constantly all in flames whenever any earthquake happens, as they disgorge that fire, which, whilst underneath, was the cause of the disaster. Indeed, (saith he,) were it not for these *diverticula*, whereby it thus gains an exit, it would rage in the bowels of the earth much more furiously, and make greater havock than it now does. So that, though those countries where there are such volcanoes are usually more or less troubled with earthquakes; yet, were these volcanoes wanting, they would be much more annoyed with them than they now are, *vea, ia*

all probability, to that degree as to render the earth, for a vast space around them, perfectly uninhabitable. In one word, so beneficial are these to the territories where they are, that there do not want instances of some which have been rescued from earthquakes by the breaking forth of a new volcano there; this continually discharging that matter, which being till then barricaded up and imprisoned in the bowels of the earth, was the occasion of very great and frequent calamities."

In every case, where we cannot discern the beneficent tendency of particular phenomena in the universe, we ought to attribute this to our limited capacities, and not arraign the almighty Sovereign. However dreadful and destructive subterraneous fires may appear; on proper reflection, it may be inferred that they are as necessary in promoting and sustaining the operations of this part of the universe, as the natural heat in men's bodies is to the preservation and support of their being.

CHAP. XLII.

CURIOSITIES RESPECTING GROTTOS, CAVES, &c.

Grotto in South Africa—Grotto del Cani—Grotto of Antiparos—Grotto of Guacharo—Snow Grotto—Cave of Fingal—Cave near Mexico—The Nitre Caves of Missouri—Okey Hole—Borrowdale—Needle's Eye.

———— Sweet interchange
Of hill and valley, rivers, woods, and plains,
Now land, now sea, and shores with forests crown'd. *Milton.*

GROTTO IN SOUTH AFRICA. From Thom's account of his Journey to South Africa.—"In the country of Kango is the greatest natural curiosity of South Africa, a grotto of unknown extent. This I visited, and spent four or five hours in it. It was generally supposed that the end of it had been discovered, but we proved it to be still unknown; though, from the information I received, we proceeded into it further than any others, and our entrance into the third newly discovered chambers, or cave, was only prevented by a descent of fourteen feet. This great and astonishing work of God is divided into various apartments, from fourteen to seventy feet in length, and eight to one hundred in breadth. By measurement, I found that we had proceeded about nine hundred feet into the cavern of a mountain, of five hundred feet in perpendicular height; the grott

is about two hundred feet above the level of the river running by the hill.

"The *stalactites*, united or disunited, form a hundred figures, so that, without any effort of imagination, nature would seem here to have assumed the province of art: for her canopies, organs, pulpits, vast candles, immense pillars, heads even of men and animals, meet the astonished visitor on all sides; so that he supposes himself in a new part of the universe. Eye, thought, and feeling, are equally overpowered; and, to complete this remarkable assemblage, there are various baths, or cisterns of water, as clear as crystal, divided by partitions, as if a most ingenious sculptor had wrought for some weeks in this subterraneous place of nature. Ten young colonists, with two slave guides, and my servant, were with me. We had a flambeau and a number of large candles; but even these did not chase away the darkness which eclipsed the beauties of this great work of nature, which had been forming from age to age, and was first discovered in the year 1788. It is a remarkable circumstance, that no traveller appears to have visited it, or the various sub-districts which I have described above, since that time till we entered it.'

THE GROTTO DEL CANI.—This is a little cavern near Pozzuoli, four leagues from Naples: the air contained in it is of a mephitical or noxious quality; it is in truth carbonic acid gas, whence also it is called *Bocca Venenosa*, the Poisonous Mouth. "Two miles from Naples, (says Dr. Mead,) just by the Lago de Agnano, is a celebrated mofeta, commonly called La Grotto del Cani, which is destructive of all animal life that comes within the reach of its vapours. It is a small grotto, about eight feet high, twelve long, and six broad; from the ground arises a thin, subtile, warm fume, visible enough to a discerning eye, which does not spring up in little parcels here and there, but in one continued stream, covering the whole surface of the bottom of the cave; having this remarkable difference from common vapours, that it does not, like smoke, disperse into the air, but quickly after its rise falls back again, and returns to the earth, or hovers to a certain height, above which it never rises. This fact is ascertained by the colour of the sides of the grotto, which, as high as the vapour ascends, is of a darkish green, but above this it has only the appearance of common earth. As I found no inconvenience from standing in it myself, so I believe no animal, if its head were kept above this mark, would be in the least injured. But when, as is often the case, a dog, or any other creature, is forcibly kept below it, or the animal is so small that it cannot hold its head above this noxious vapour, it presently loses all voluntary motion, falls down as dead, or in a swoon;

the limbs at first become convulsed and trembling, till at last no more signs of life appear, than a very weak and almost insensible beating of the heart and arteries; which, if the animal is left a little longer, quickly ceases also, and then its fate is irrevocable; but if it be snatched out and laid in the air, it soon revives, and, if thrown into the adjacent lake, resuscitation is still more rapid."

We now proceed to the famous GROTTO OF ANTIPAROS.—This grotto takes its name from the small island in which it is situated. The following is Mr. Charles Saunders's account of his descent into this celebrated grotto.

"Its entrance lies in the side of a rock, and is a spacious arch, formed of rough crags, overhung with fantastic wreaths of climbing shrubs. Our party amounted to six, attended by the same number of guides, furnished with lighted torches. We presently lost every ray of daylight, but following our leaders, we entered into a low narrow passage, lined on all sides with stones, that, from the reflection of the torches, glittered like diamonds, and displayed the colours of the rainbow. At the end of this passage, our guides desired us to tie a rope about our waists, and then led us to the brink of a frightful precipice. The descent was steep, and the place dark and gloomy. The exchange of the lane of diamonds for this abyss of darkness was very unwelcome; but I had travelled far to gratify my curiosity, and I hazarded the event. The rope being held by the guides at top, I was first let down, and, after dangling a minute or two, reached the bottom with my feet.

"My friends, encouraged by my example, followed; and we pursued our way under a roof of ragged rocks for thirty yards, hoping every moment to see the opening of the expected grotto; but our guides plainly told us we had far to go, and much to encounter, before we should reach it, and those who wanted courage and perseverance had better return. None of us, however, would act so cowardly a part, though the sight of another precipice, much deeper and more formidable than the first, almost shook our resolution. By the light of the torches, we could perceive that we were to plunge into a place encumbered with vast pieces of rough rugged rocks, and that we should be forced sometimes to climb over, and sometimes to creep under them; while on the other side were numerous dark caverns, like so many wells, which if one's foot should slip, would swallow us up. Two of our guides went before us, and as we stood on the edge, we were terrified to see them go lower, till they appeared at a frightful depth beneath us. When they were at the bottom, they hallooed to us, and we very reluctantly followed. In the midst of the

way, we came to a place where a rock that was perpendicular, and a vast cavern, on one side threatened us with destruction, whilst a wall of rugged rock seemed impassable on the other. Here again we hesitated whether to proceed or not: but the guides assured us they had often gone the same way with safety, we therefore took fresh resolution, and on we went to a corner, where was placed an old, slippery, rotten ladder, which we ventured to descend.

"At the bottom we perceived ourselves at the entrance of another passage, which was rather dismal, but not wholly without beauty. A wide gradual descent led us into a noble vault, with a bottom of fine, green, glossy marble, over which we were to slide on our seats; and it was with difficulty we could keep ourselves from going too fast, and tumbling over one another. The walls and arch of the roof is as smooth in most places as if chiselled by a skilful workman, and are formed of a glistening red and white granite, supported in several places with columns of a deep blood-coloured shining porphyry. Here, to our terror, we lost sight of the two guides that went before us, and at the end of the passage found ourselves at the brink of another precipice, the bottom of which we reached by the help of a ladder, not much better than the former.

"Had not the dread of falling taken up my attention, I should have admired many of the natural ornaments of this obscure cavity. The rock to which the ladder was fixed was one mass of red marble, covered with white branches of rock crystal, and might be compared, from the hue of the rock behind, to an immense sheet of amethysts. From the foot of this ladder, we were compelled to slide, face downwards, through another shallow vault of polished green and white marble, for about twenty feet; and we then rejoined our guides, who prudently gave us some refreshment, to enable us to face the dangers we had yet to encounter.

"We now advanced through: a narrow slanting passage of rough coarse stone, so much resembling snakes curled round, that nothing was wanting but a hissing sound, to make us fancy that thousands of those noisome reptiles surrounded us. There was still another terrible precipice to pass; but as we heard that it was the last, we made no hesitation in descending the ladder. After this, we proceeded upon even ground for about forty yards, when we were again entreated by our guides to fasten the ropes about our waists; not for the purpose of suspending us over a height, but as a means of security against the lakes and deep waters that are numerous in this part of the cavern. At length we reached the last passage, the dismal gloom of which might furnish images for a poetical description of Tartarus. The sides and roof were

formed of black stone, and the way was so rugged, that we were often obliged to slide upon our backs. The angles of the rocks cut our clothes, and bruised our flesh in a miserable manner.

"Though I believed myself so near the object of my curiosity, I wished sincerely that I had never been allured, by the accounts of travellers, to venture into such a horrible place, when suddenly we lost sight of four out of our six guides. The want of their torches increased the melancholy gloom; and the supposition that they had fallen into some of the black pools of water that abound here, added to the apprehension for our own safety, as well as concern for their fate. The two remaining guides assured us, that their companions were safe, and that we should soon be rewarded for all that we had suffered, if we would but advance. Our passage was now become very narrow, and we were obliged to crawl on all fours over rugged rocks, when, hearing a little hissing noise, in an instant we were left in utter darkness. To our inexpressible terror, the guides told us that they had accidentally dropped their torches into one of the pools; but that there was no danger in crawling forward, as we should soon overtake their fellows. I now gave myself up for lost, and expected that I must perish in this dreadful cavern. Whilst I thus yielded to despair, one of the guides came to me, blindfolded me with his hand, and dragged me a few paces forward. I imagined his design was to rob and murder me; however, in the midst of my panic, he lifted me over a huge stone, and set me on my feet, withdrawing his hand from my eyes at the same time.

"What words can express my transport and astonishment: instead of darkness and despair, all was splendour and magnificence. The six guides welcomed me into the Grotto of Antiparos. Those whom we had missed, only went before to prepare the grotto for our reception, which was illuminated with fifty torches, and produced an effect no words can describe. Imagine yourself in an arched cavern, 485 yards deep, 120 yards wide, 113 long, and, as near as we could measure by the eye, about 60 yards high, lined on every part with brilliant crystallized white marble, and well illuminated. The roof is a grand vaulted arch, hung all over with pendent icicles of shining white marble, some of them ten feet long, and covered with clusters of the same material, resembling festoons and garlands of flowers, glittering like precious stones. From the sides of the arch proceed fantastic forms of the same glittering spar, that fancy can easily shape into trees, entwined with flowers and climbing shrubs; and in some parts the congelations have taken the appearance of the meanders of a winding stream. The floor, though rough and uneven, is full of crystals of all colours.

"It is impossible to convey any adequate idea of the splendours of this natural temple, the ornaments of which are formed of the droppings of water, that, in great length of time, become congealed into a kind of brilliant spar.

"Having contemplated this charming spectacle with delight, and raised our aspiration to that Being, whose creative powers are displayed in the most obscure, as well as in the most visible part of his works, we returned, impressed with the conviction, that no good can be attained without difficulty and perseverance."

THE GROTTO OF GUACHARO.—The gulf of Cariacho is frequented by innumerable flocks of marine birds, of various kinds. "When the natives wish to catch any of these wild fowl, (says M. Lavayse,) they go into the water, having their heads covered each with a calabash, in which they make two holes for seeing through. They thus swim towards the birds, throwing a handful of maize on the water from time to time, which becomes scattered on the surface. The ducks and other birds approach to feed on the maize, and at that moment the swimmer seizes them by the feet, pulls them under water, and wrings their necks before they can make the least movement, or, by their noise, spread an alarm among the flock. The swimmer attaches those he has caught to his girdle, and he generally takes as many as are necessary for his family."

Amongst the natural curiosities of this neighbourhood, is a lake full of crocodiles, and various other reptiles, one of which, if we are to believe a common tradition of the people, resembles the winged dragon of the poets. In going from Carupano to Guiria, our author passed through the "smiling valley" of Rio Corbe, watered by numerous streams, and which he calls the Temple and Compagna of Venezuela. Speaking of the celebrated Grotto of Guacharo, in the mountains of Bergantin, M. Lavayse observes, "In every country the same causes have produced similar effects on the imagination of our species. The grotto of Guacharo is, in the opinion of the Indians, a place of trial and expiation: souls, when separated from their bodies, go to this cavern; those men who die without reproach do not remain in it, but immediately ascend, to reside with the great Manitou in the dwellings of the blessed; and such men as have committed but slight faults, of a venial nature, are kept there for a longer or shorter period, according to their crime; while those of the wicked are retained there eternally.

"Immediately after the death of their parents and friends, the Indians proceed to the entrance of this cavern, to listen to their groans. If they think they hear their voices, they also lament, and address a prayer to the Great Spirit, and

another to the devil, Muboya; after which they drown their grief with intoxicating beverages: but, if they do not hear the voices of their friends, they express their joy by dances and festivals. In all this, there is but one circumstance that creates surprise; it is, that the Indian priests have not availed themselves of such credulity to augment their revenues. Many Indians, though otherwise converted to Christianity, have not ceased to believe, that to be in the cave of Guacharo is synonymous with dying.

"Thus, in the majestic forests of South America, as in the ancient civilization of Hindoostan; under the harsh climates of the north of Europe and Canada, as in the burning regions of Africa; in all parts, men of every colour are distinguished from other animals by this irresistible foreboding of a future life, in which an Omnipotent Being recompenses the good and punishes evil doers. Whatever may be the modifications, differences, or absurdities, with which imagination, ignorance, and greedy imposture, have enveloped this belief, it appears to be one of the strongest moral proofs of the identity of our species, and to be a natural consequence of reflection."—*Sketches of South America.*

We will now beg the attention of our readers, while we relate some particulars respecting THE SNOW GROTTO.—This is an excavation made by the waters on the side of Mount Etna, by making their way under the layers of lava, and carrying away the bed of pozzolano below them. It occurred to the proprietor, that this place was very suitable for a magazine of snow; for in Sicily, at Naples, and particularly at Malta, they are obliged, for want of ice, to make use of snow for cooling their wine, sherbet, and other liquors, and for making sweetmeats. This grotto was hired, or bought, by the knights of Malta, who having neither ice nor snow on the burning rock which they inhabit, have hired several caverns on Etna, into which, people whom they employ, collect and preserve quantities of snow, to be sent to Malta when needed. This grotto has therefore been repaired within, at the expense of the order; flights of steps are cut into it, as well as two openings from above, through which they throw in the snow, and by means of which the grotto is enlightened. Above the grotto they have also levelled a piece of ground of considerable extent: this they have inclosed with thick and lofty walls, so that when the winds, which at this elevation blow with great violence, carry the snow from the higher parts of the mountain, and deposit it in this inclosure, it is retained and amassed by the walls. The people then remove it into the grotto, through the two openings; and it is there laid up and preserved in such a manner as to resist the force of the summer heats, as

the layers of lava, with which the grotto is arched above, prevent them from making any impression.

When the season for exporting the snow comes on, it is put into large bags, into which it is pressed as closely as possible; it is then carried by men out of the grotto, and laid upon mules, which convey it to the shore, where small vessels are waiting to carry it away. But before those lumps of snow are put into bags, they are wrapped in fresh leaves; so that while they are conveyed from the grotto to the shore, the leaves may prevent the rays of the sun from making any impression upon them.

The Sicilians carry on a considerable trade in snow, which affords employment to some thousands of men, horses, and mules. They have magazines of it on the summits of their loftiest mountains, from which they distribute it through all their cities, towns, and houses; for every person in the island makes use of the snow. They consider the practice of cooling their liquors as absolutely necessary for the preservation of health; and in a climate, the heat of which is constantly relaxing the fibres, cooling liquors, by communicating a proper tone to the fibres of the stomach, must greatly strengthen them for the performance of their functions. In this climate a scarcity of snow is no less dreaded than a scarcity of corn, wine, or oil. We are informed by a gentleman who was at Syracuse in 1777, when there was a scarcity of snow, that the people of the town learned that a small vessel laden with that article was passing the coast: without a moment's deliberation, they ran in a body to the shore, and demanded her cargo; which when the crew refused to deliver up, the Syracusans attacked and took, though with the loss of several men.

The next object that claims our regard is **THE CAVE OF FINGAL, OR AN-UA-VINE, IN THE ISLAND OF STAFFA:** From Faujas St. Fond's Travels in England, Scotland, and the Hebrides.

"This superb and magnificent monument of a grand subterraneous combustion, the date of which has been lost in the lapse of ages, presents an appearance of order and regularity so wonderful, that it is difficult for the coldest observer, and a person the least sensible to the phenomena which relate to the convulsions of the globe, not to be singularly astonished by this prodigy, which may be considered as a kind of natural palace.

"To shelter myself from all critical observation on the emotions which I experienced while contemplating the most extraordinary of any cavern known, I shall borrow the expressions of him who first described it. Those who are acquainted with the character of this illustrious naturalist,

Sir Joseph Banks, will not be apt to accuse him of being liable to be hurried away by the force of a too ardent imagination; but the sensation which he felt at the view of this magnificent scene was such, that it was impossible to escape a degree of just enthusiasm.

“The impatience which every body felt to see the wonders we have heard so largely described, prevented our morning’s rest; every one was up and in motion before the break of day, and with the first light arrived at the south-west part of the island, the seat of the most remarkable pillars. We were no sooner arrived at this place, than we were struck with a scene of magnificence which exceeded our expectation, though formed as we thought upon the most sanguine foundations. The whole of that end of the island is supported by ranges of natural pillars, mostly above fifty feet high, standing in natural colonnades, according as the bays or points of land formed themselves, upon a firm basis of solid shapeless masses of rock. In a short time we arrived at the mouth of the cave, the most magnificent, I suppose, that has ever been described by travellers.

‘The mind can hardly form an idea of any thing more magnificent than such a space, supported on each side by ranges of columns, and roofed by the bottoms of those from which they have been broken, in order to form it, between the angles of which a yellow stalagmitic matter has exuded; this serves to define the angles precisely, and at the same time vary the colour with a great deal of elegance, and, to render it still more agreeable, the whole is lighted from without; so that the farthest extremity is very plainly seen from the outside, and the air within, being agitated by the flux and reflux of the tides, is perfectly dry and wholesome, entirely free from the vapours with which natural caverns in general abound.”

The following description of the same place by Mr. Troil, is also worthy of our notice:—

“How splendid (says this prelate) do the porticos of the ancients appear in our eyes, from the ostentatious magnificence of the descriptions we have received of them! and with what admiration are we seized, on seeing even the colonnades of our modern edifices! but when we behold the cave of Fingal, formed by nature in the isle of Staffa, it is no longer possible to make a comparison; and we are forced to acknowledge that this piece of architecture, executed by nature, far surpasses that of the Louvre, that of St. Peter at Rome, and even what remains of Palmira and Pestum, and all that the genius, the taste, and the luxury of the Greeks, were ever capable of inventing.”—*Letters on Iceland*.

Such also was the impression made by the cave of Fingal, on Sir Joseph Banks, and on the Bishop of Linckœping.—

"I have seen many ancient volcanoes, and have given descriptions of several superb basaltic causeways and delightful caverns in the midst of lavas; but I have never found any thing which comes near this, or can bear any comparison with it, either for the admirable regularity of the columns, the height of the arch, the situation, the forms, the elegance of this production of nature, or for its resemblance to the masterpieces of art, though this had no share in its construction. It is therefore not at all surprising that tradition should have made it the abode of a hero.

"This amazing monument of nature is thirty-five feet wide at the entrance, fifty-six feet high, and a hundred and forty feet long.

"The upright columns which compose the frontispiece, are of the most perfect regularity. Their height, to the beginning of the curvature, is forty-five feet.

"The arch is composed of two unequal segments of a circle, which form a sort of natural pediment.

"The mass which crowns, or rather which forms the roof, is twenty feet thick in the lowest part. It consists of small prisms, more or less regular, inclining in all directions, closely united and cemented underneath, and in the joints, with a yellowish white calcareous matter, and some zeolitic infiltrations, which give this fine ceiling the appearance of mosaic work.

"The sea reaches to the very extremity of the cave. It is fifteen feet deep at the mouth; and its waves, incessantly agitated, beat with great noise against the bottom and walls of the cavern, and every where break into foam. The light also penetrates through its whole length, diminishing gradually inwards, and exhibiting the most wonderful varieties of colour.

"The right side of the entrance presents, on its exterior part, a vast amphitheatre, formed of different ranges of large truncated prisms, the top of which may be easily walked on. Several of these prisms are jointed, that is, concave on the one side, and convex on the other; and some of them are divided by simple transverse intersections.

"These prisms, consisting of a very durable and pure black basalt, are from one to three feet in diameter. Their forms are triangular, tetrapedral, pentagonal, and hexagonal; and some of them have seven or eight sides. I saw several large prisms, on the truncatures of which are distinctly traced the outlines of a number of smaller prisms; that is, these prisms are formed of a basalt, which has a tendency to subdivide itself likewise into prisms. I had before observed the same phenomenon in the basaltic prisms of Vivarais.

"The cave can be entered only by proceeding along the plat-

form on the right side, which I have mentioned above. But the way grows very narrow and difficult as it advances ; for this sort of interior gallery, raised about fifteen feet above the level of the sea, is formed entirely of truncated perpendicular prisms of a greater or less height, between which considerable address is necessary to choose one's steps, the passages being so strait and so slippery, owing to the droppings from the roof, that I took the very prudent resolution, suggested by our two guides, to proceed barefooted, and take advantage of their assistance, especially in a particular place, where I had room only to plant one foot, whilst I clung with my right hand to a large prism to support myself, and held the hand of one of the guides by the other. This difficult operation took place at the darkest part of the cave ; and one half of the body was at the time suspended over an abyss, where the sea dashed itself into a cloud of foam.

"I was desirous of penetrating to the farthest extremity, and I accomplished my purpose, though not without considerable difficulty and danger. I more than once found my attention distracted from the observations which I was happy to have an opportunity of making, to the thought of how I should get back again.

"As I drew near to the bottom of the cave, the bold balcony, on which I walked, expanded into a large sloping space, composed of thousands of broken vertical columns. The bottom was bounded by a compact range of pillars of an unequal height, and resembling the front of an organ."

It is worthy of remark, that at the time when Mr. Troil visited the cave, the sea, by one of those uncommon chances which do not happen once in ten years, was so calm, that it permitted him to enter with a boat.

"At the very bottom of the cave, (says he,) and a little above the surface of the water, there is a kind of small cave, which sends forth a very agreeable noise every time that the water rushes into it."—*Letters on Iceland*.

"As the sea was far from being completely still when I visited it, I heard a noise of a very different nature every time that the waves, in a rapid succession, broke against its bottom. This sound resembled that which is produced by striking a large hard body with great weight and force against another hard body in a subterraneous cavity. The shock was so violent, that it was heard at some distance, and the whole cavern seemed to shake with it. Being close to the place whence the sound issued, and where the water is not so deep, upon the retreat of the wave, I endeavoured to discover the cause of this terrible collision. I soon observed, that, a little below the basis which supported the organ-fronted colonnade, there was an aperture which formed the outlet of a hollow, or per-

haps a small cave. It was impossible to penetrate into this cavity; but it may be presumed that the tremendous noise was occasioned by a broken rock, driven by the violent impetuosity of the surge against its sides. By the boiling motion of the water, however, in the same place, it is evident that there are several other small passages, through which it issues, after rushing into the principal aperture in a mass. It is therefore not impossible, when the sea is not sufficiently agitated to put the imprisoned rock in motion, that the air, strongly compressed by the weight of the water, which is in incessant fluctuation, should, on rushing out by the small lateral passages, produce a particularly strange sound. It might then be truly regarded as an organ created by the hand of nature; and this circumstance would fully explain why the ancient and real name of this cave, in the Erse language, is, *The Melodious Cave.*"

Sir Joseph Banks, in the description which he has given us of the cave of Staffa, says, that "between the angles a yellow stalagmitic matter has exuded, which seemed to define the angles precisely." That is true; but the learned naturalist has not told us the nature of this yellowish matter.

Mr. Troil mentions it also: he says, that the "colour of the columns is a dark gray, but that the joints are filled with a quartzose stalactites, which distinctly marks the separation of the columns, and which, by the variety of its tints, has the most agreeable effect on the eye. On breaking off several pieces of it, which it is not very easy to do, owing to the height of the vault, I found that it was nothing but a calcareous matter, coloured by the decomposition of the iron of the lava, and intermixed with a little argillaceous earth. This stalactites has also very little adhesion, and is, in general, of an earthy nature. In several of the prisms I found some globules of zeolites, but in very small quantity. I also broke off from between two prisms, which were so apart as to admit of introducing my hand, an incrustation in which the white and transparent zeolites was formed into very perfect small cubical crystals, several of which were coloured red by the ferruginous lime arising from the decomposition of the lava. But I must repeat, that zeolites is very rare in this cave, and having myself broken off all the specimens that I was able to see, I doubt whether those who may visit the place after me will find any quantity of it."

Dimensions of the Cave of Fingal.—Breadth of the entrance, taken at the mouth and at the level of the sea, thirty-five feet; height, from the level of the sea to the pitch of the arch, fifty-six feet; depth of the sea, opposite to the entrance, and twelve feet distant from it, at noon of the 27th of September, fifteen feet; thickness of the roof, measured from the pitch of

the arch without to its highest part, twenty feet; interior length of the cave from the entrance to the extremity, one hundred and forty feet; height of the tallest columns on the right side of the entrance, forty-five feet; depth of the sea in the interior part of the cave, ten feet nine inches, in some places eight feet, and towards the bottom somewhat less

CAVE NEAR MEXICO.—A traveller of credit gives us an account, in the *Philosophical Transactions*, of a remarkable cave, some leagues to the north-west of Mexico, gilded all over with a sort of leaf-gold, which had deluded many Spaniards by its promising colour, but they could never reduce it into a body, either by quicksilver or fusion. This traveller went thither one morning with an Indian for his guide, and found its situation was pretty high, and in a place very proper for the generation of metals.

As he entered into it, the light of the candle soon discovered on all sides, but especially over his head, a glittering canopy of these mineral leaves, at which he greedily snatching, there fell down a great lump of sand, that not only put out his candle, but almost blinded him, and calling aloud to his Indian, who stood at the entrance of the cave, as being afraid of spirits and hobgoblins, it occasioned such thundering and redoubled echoes, that the poor fellow, imagining he had been wrestling with some infernal ghosts, soon quitted his station, and thereby left a free passage for some rays of light to enter, and serve him for a better guide. The traveller's sight was somewhat affected by the corrosive acrimony of the mineral dust; but having relighted his candle, he proceeded in the cave, heaped together a quantity of the mineral mixed with sand, and scraped off from the surface of the earth some of the glittering leaves, none of which exceeded the breadth of a man's nail, but with the least touch were divided into many lesser spangles, and with a little rubbing they left his hand gilded all over.

We must not neglect to notice **THE NITRE CAVES OF MISSOURI.**—"On the banks of the Merrimack and the Gasconade are found numerous caves, which yield an earth impregnated largely with nitre, which is procured from it by lixiviation. On the head of Current's river are also found several caves from which nitre is procured, the principal of which is Ashley's cave, or Cave Creek, about eighty miles south-west of Potosi. This is one of those stupendous and extensive caverns, that cannot be viewed without exciting our wonder and astonishment, which is increased by beholding those complete works for the manufacture of nitre, situated in its interior

"The native nitrate of potash is found in beautiful white crystals, investing the fissures of the limestone rock which forms the walls of this cave; and several of those in its vicinity exhibit the same phenomenon."—*Schoolcroft, on the Lead Mines of Missouri*

OKEY HOLE.—This is a famous natural cavern of England, on the south side of Mendip hills. The entrance is in the fal of those hills, which is beset all about with rocks, and there is near it a precipitate descent of twelve fathoms deep, at the bottom of which there continually issues from the rocks a considerable current of water. The naked rocks above the entrance are about thirty fathoms high, and the whole ascent of the hill above, which is very steep, is about a mile. The entrance into this vault is at first upon a level, but advancing farther, the way is rocky and uneven, sometimes ascending, and sometimes descending.

The roof of this cavern, in the highest part, is about eight fathoms from the ground, but in many places it is so low, that one must stoop to get along. The breadth is not less various than the height, for in some places it is five or six fathoms wide, and in others not more than one or two. It is in length about two hundred yards. At the farthest part of the cavern there is a stream of water, large enough to drive a mill, which passes all along one side of the cavern, and at length slides down about six or eight fathoms among the rocks, and, finding its way through the clefts, falls into the valley beneath. The river within the cavern is well stored with eels, and has some trouts. In dry summers, a great number of frogs are seen all along this cavern, even to the farthest part of it; and on the roof are vast numbers of bats.

From Okey Hole we proceed to **BORROWDALE**,—which is a most romantic valley among the Derwent-Water Fells, in the county of Cumberland. These fells or hills are some of the loftiest in England, and it is in one of them that the black lead, or wadd, is found, from which all parts of the world are supplied. The mines are opened once in seven years, and when a sufficient quantity of this valuable and singular mineral is taken out, they are carefully closed again. In travelling among these mountains, the idea that presents itself to the astonished spectator, is that of the earth having been agitated like the ocean in a storm; the hills appear like waves, one behind another, and were it not for the abrupt and sudden scarps, and the immense masses of rugged rocks, that give the idea of fixedness and stability, the fancy might be bewildered so far as to imagine they were in a state of undulation, and ready to mingle with each other.

Borrowdale is watered by the clearest brooks, which, precipitated from the hills, form many beautiful waterfalls, and then meet together in the dale in one large stream, and pass out of it under the name of Borrowdale Beck, when they spread out into an extensive lake, forming many beautiful islands; the lake is called Derwent-water, or Keswick Lake. Borrowdale is four miles from Keswick, in passing from which, the traveller has the lake on his left hand, and stupendous rocky precipices on the other; with huge stones, or rugged masses of rock, which have tumbled from above, perhaps rent from the mountain by the expansion of the water in its crevices or fissures, which, congealing into ice, occasions the scattered fragments that lie in his way. As he approaches the dale, he sees the shelves, or ledges of the rocks, covered with herbage, shrubs, and trees, and villages and farms rise in his view; the larger cattle are seen feeding in the lower grounds, and the sheep in very large flocks upon the mountains.

We shall close this division with an account of **THE NEEDLE'S EYE**.—This name is given to a subterraneous passage on the coast of Banffshire, one hundred and fifty yards long from sea to sea, but through which a man can with difficulty creep. At the north end of it is a cave, twenty feet high, thirty broad, and one hundred and fifty long, containing a space of ninety thousand cubic feet. The whole is supported by immense columns of rocks, is exceedingly grand, and has a surprisingly fine effect on the spectator, after creeping through the narrow passage.

CHAP. XLIII.

CURIOSITIES RESPECTING MINES.***Diamond Mine in the Brazils—Mines of Peru—Volcanic Eruptions of Mud and Salt—Pitch Wells—Visit to a Coal-Pit.***

Through dark retreats pursue the winding ore,
 Search Nature's depths, and view her boundless store;
 The secret cause in tuneful numbers sing,
 How metals first were fram'd, and whence they spring
 Whether the active sun, with chemic flames,
 Through porous earth transmits its genial beams;
 With heat impregnating the womb of night,
 The offspring shines with its paternal light:
 Or whether, urged by subterraneous flames,
 The earth ferments, and flows in liquid streams
 Purg'd from their dross, the nobler parts refine,
 Receive new forms, and with fresh beauties shine:
 Or whether by creation first they sprung,
 When yet unpois'd the world's great fabric hung:
 Metals the basis of the earth were made,
The bars on which its fix'd foundations laid;
 All second causes they disdain to own,
 And from th' Almighty's fiat sprung alone. *Yalden.*

Description of a **DIAMOND MINE** on the river Tigitonhonha, in the Brazilian territory; by Mr. Mawe.

"I could not (says the writer) resist the favourable opportunity now offered me of gratifying the curiosity which had so long occupied my mind, by visiting the diamond mines, in company with the principal officer in the administration of them, who was therefore qualified to furnish me with the amplest information. A fine horse was waiting for me at the door, and I rode up to the house of the governor, who introduced me to his amiable lady, daughters, and family, with whom I had the honour to take breakfast. Several officers of the diamond establishment arrived on horseback to accompany us, their presence being required on this occasion.

"Having arrived at the place, I remained here five days, during which I was occupied in viewing and examining various parts of the works, of which I shall here attempt to give a general description.

"The river Tigitonhonha is formed by a number of streams, and is as wide as the Thames at Windsor, and in general from three to nine feet deep. The part now in working is a curve or elbow, from which the current is diverted into a canal cut across the tongue of land round which it winds, the river

being stopped, just below the head of the canal, by an embankment formed of several thousand bags of sand. This is a work of considerable magnitude, and requires the co-operation of all the negroes to complete it; for the river being wide and not very shallow, and also occasionally subject to overflow, they have to make the embankment so strong as to resist the pressure of the water, admitting it to rise four or five feet.

"The deeper parts of the channel of the river are laid dry by means of large caissons or chain-pumps, worked by a water-wheel. The mud is then carried off, and the cascalhao is dug up, and removed to a convenient place for washing. This labour was, until lately, performed by the negroes, who carried the cascalhao in gamellas on their heads; but Mr. Camara has formed two inclined planes, about one hundred yards in length, along which carts are drawn by a large water-wheel, divided into two parts, the ladles or buckets of which are so constructed, that the rotary motion may be altered by changing the current of water from one side to the other; this wheel, by means of a rope made of untanned hides, works two carts, one of which descends empty on one inclined plane, while the other, loaded with cascalhao, is drawn to the top of the other, where it falls into a cradle, empties itself, and descends in its turn. At a work called Canjeca, formerly of great importance, about a mile up the river on the opposite side, there are three cylindrical engines for drawing the cascalhao, like those used in the mining country of Derbyshire, and also railways over some uneven ground. This was the first and only machinery of consequence, which I saw in the diamond district, and there appear many obstacles to the general introduction of it. Timber, when wanted of large size, has to be fetched a distance of one hundred miles, at a very heavy expense; there are few persons competent to the construction of machines, and the workmen dislike to make them, fearing that this is only part of a general plan for suspending manual labour.

"The stratum of cascalhao consists of the same materials with that in the gold district. On many parts, by the edge of the river, are large conglomerate masses of rounded pebbles cemented by oxide of iron, which sometimes envelop gold and diamonds. They calculate on getting as much cascalhao in the dry season, as will occupy all their hands during the months which are more subject to rain. When carried from the bed of the river whence it is dug, it is laid in heaps, containing apparently from five to fifteen tons each.

"Water is conveyed from a distance, and is distributed to the various parts of the works by means of aqueducts constructed with great ingenuity and skill. The method of wash-

ing for diamonds at this place, is as follows:—A shed is erected in the form of a parallelogram, twenty-five or thirty yards long, and about fifteen wide, consisting of upright posts, which support a roof thatched with long grass. Down the middle of the area of this shed, a current of water is conveyed through a canal, covered with strong planks, on which the cascalhao is laid two or three feet thick. On the other side of the area is a flooring of planks, from four to five yards long, imbedded in clay, extending the whole length of the shed, and having a slope, from the canal, of three or four inches to a yard. This flooring is divided into about twenty compartments or troughs, each about three feet wide, by means of planks placed on their edge. The upper ends of all these troughs (here called canoes) communicate with the canal, and are so formed that water is admitted into them between two planks that are about an inch separate. Through this opening the current falls about six inches into the trough, and may be directed to any part of it, or stopped, at pleasure, by means of a small quantity of clay. For instance, sometimes water is required only from one corner of the aperture, then the remaining part is stopped; sometimes it is wanted from the centre, then the extremes are stopped; and sometimes only a gentle rill is wanted, then the clay is applied accordingly. Along the lower ends of the troughs a small channel is dug, to carry off the water. On the heap of cascalhao, at equal distances, are placed three high chairs, for the officers or overseers. After they are seated, the negroes enter the troughs, each provided with a rake of a peculiar form, and short handle, with which he rakes into the trough about fifty or eighty pounds weight of cascalhao. The water being then let in upon it, the cascalhao is spread abroad, and continually raked up to the head of the trough, so as to be kept in constant motion. This operation being performed for the space of a quarter of an hour, the water then begins to run clearer; having washed the earthy particles away, the gravel-like matter is raked up to the end of the trough; after the current flows away quite clear, the largest stones are thrown out, and afterwards those of inferior size, then the whole is examined with great care for diamonds. When a negro finds one, he immediately stands upright and claps his hands, then extends them, holding the gem between his fore finger and thumb; an overseer receives it from him, and deposits it in a gamella or bowl, suspended from the centre of the structure, half full of water. In this vessel all the diamonds found in the course of the day, are placed, and at the close of work are taken out, and delivered to the principal officer, who, after they have been weighed, registers the particulars in a book kept for that purpose. When a negro is so fortunate as to find a diamond

of the weight of 17½ carats, much ceremony immediately takes place; he is crowned with a wreath of flowers, and carried in procession to the administrator, who gives him his freedom, by paying his owner for it. He also receives a present of new clothes, and is permitted to work on his own account. When a stone of eight or ten carats is found, the negro receives two new shirts, a complete new suit, with a hat, and a handsome knife. For smaller stones of trivial amount, proportionate premiums are given. During my stay at Tejuco, a stone of 16½ carats was found: it was pleasing to see the anxious desire manifested by the officers that it might prove heavy enough to entitle the poor negro to his freedom; and when, on being delivered and weighed, it proved only a carat short of the requisite weight, all seemed to sympathize in his disappointment.

“Many precautions are taken to prevent the negroes from embezzling diamonds. Although they work in a bent position, and consequently never know whether the overseers are watching them or not, yet it is easy for them to omit gathering any which they see, and to place them in a corner of the trough for the purpose of secreting them at leisure hours; to prevent which they are frequently changed while the operation is going on. A word of command being given by the overseers, they instantly move into each others' troughs, so that no opportunity of collusion can take place. If a negro be suspected of having swallowed a diamond, he is confined in a strong room until the fact can be ascertained. Formerly, the punishment inflicted upon a negro for smuggling diamonds, was confiscation of his person to the state: but it being thought too hard for the owner to suffer for the offence of his servant, the penalty has been commuted for personal imprisonment and chastisement. This is a much lighter punishment than that which their owners, or any white man, would suffer for a similar offence.

“There is no particular regulation respecting the dress of the negroes: they work in the clothes most suitable to the nature of their employment, generally in a waistcoat and a pair of drawers, and not naked, as some travellers have stated. Their hours of labour are from a little before sunrise until sunset, half an hour being allowed for breakfast, and two hours at noon. While washing, they change their posture as often as they please, which is very necessary, as the work requires them to place their feet on the edges of the trough, and to stoop considerably. This posture is particularly prejudicial to young growing negroes, as it renders them in-kneed. Four or five times during the day, they all rest, when snuff, of which they are very fond, is given to them.

“The negroes are formed into working parties, called troops,

containing 200 each, under the direction of an administrator and inferior officers. Each troop has a clergyman and a surgeon to attend it. With respect to the subsistence of the negroes, although the present governor has in some degree improved it, by allowing a daily portion of fresh beef, which was not allowed by his predecessors, yet I am sorry to observe that it is still poor and scanty; and that in other respects they are more hardly dealt with than those of any other establishment which I visited: notwithstanding this, the owners are all anxious to get their negroes into the service, doubtless from sinister motives.

"The officers are liberally paid, and live in a style of considerable elegance, which a stranger would not be led to expect in so remote a place. Our tables were daily covered with a profusion of excellent viands, served up on fine Wedgewood ware, and the state of their household generally corresponded with this essential part of it. They were ever ready to assist me in my examination of the works, and freely gave me all the necessary information respecting them

"Having detailed the process of washing for diamonds, I proceed to a general description of the situation in which they are found. The flat pieces of ground on each side the river are equally rich throughout their extent, and hence the officers are enabled to calculate the value of an unworked place, by comparison with the amount found on working with the part adjoining. These known places are left in reserve, and trial is made of more uncertain grounds. The following observation I often heard from the intendant: 'That piece of ground (speaking of an unworked flat by the side of the river) will yield me ten thousand carats of diamonds, whenever we shall be required to get them in the regular course of working, or when, on any particular occasion, an order from government arrives, demanding an extraordinary and immediate supply.'

"The substances accompanying diamonds, and considered good indications of them, are bright bean-like iron ore, a slaty flint-like substance, approaching Lydian stone, of fine texture, black oxide of iron in great quantities, rounded bits of blue quartz, yellow crystals, and other materials entirely different from any thing known to be produced in the adjacent mountains. Diamonds are by no means peculiar to the beds of rivers or deep ravines; they have been found in cavities and watercourses on the summits of the most lofty mountains. I had some conversation with the officers, respecting the matrix of the diamond, not a vestige of which could I trace. They informed me, that they often found diamonds cemented in pudding-stone, accompanied with grains of gold, but that they always broke them out, as they could not enter them in the treasury, or weigh them with matter adhering to them.

I obtained a mass of pudding-stone, apparently of very recent formation, cemented by ferruginous matter enveloping many grains of gold; and likewise a few pounds weight of the *cascalhao* in its unwashed state. This river, and other streams in its vicinity, have been in washing many years, and have produced great quantities of diamonds, which have ever been reputed of the finest quality. They vary in size: some are so small that four or five are required to weigh one grain, consequently sixteen or twenty to the carat: there are seldom found more than two or three stones of from seventeen to twenty carats in the course of a year, and not once in two years is there found throughout the whole washings a stone of thirty carats. During the five days I was here, they were not very successful; the whole quantity found amounted only to forty, the largest of which was only four carats, and of a light green colour.

"From the great quantity of debris, or worked *cascalhao*, in every part near the river, it is reasonable to calculate that the works have been in operation above forty years; of course there must arrive a period at which they will be exhausted, but there are grounds in the neighbourhood, particularly in the Cerro de St. Antonio, and in the country now inhabited by the Indians, which will probably afford these *gems* in equal abundance."

THE MINES OF PERU.—There are great numbers of very rich mines which the waters of the ocean have invaded. The disposition of the ground, which from the summit of the Cordilleras goes continually shelving to the South Sea, renders such events more common at Peru than in other places. This has been in some instances remedied. Joseph Salcedo, about 1660, discovered, near Puna, the mine of Laycacoto. It was so rich that they often cut the silver with a chisel. It was at last overflowed with water; but in 1740, Diego de Bacua associated with others to divert the springs. The labours which this difficult undertaking required, were not finished till 1754. The mine yields as much as it did at first. But mines still richer have been discovered; such as that of Potosi, which was found in the same country where the Incas worked that of Parco. An Indian, named Hualpa, in 1545, pursuing some deer, in order to climb certain steep rocks, laid hold of a bush, the roots of which loosened from the earth, and brought to view an ingot of silver. The indian had recourse to it for his own use. The change in his fortune was remarked by one of his countrymen, and he discovered to him the secret. The two friends could not keep their counsel, and enjoy their good fortune. They quarrelled; on which the indiscreet confidant discovered the whole to his master,

Villaroel, a Spaniard. Upon this the mine was worked, and a great number of others were found in its vicinity, the principal of which are in the northern part of the mountain, and their direction is from north to south. The fame of Potosi soon spread abroad; and there was quickly built at the foot of the mountain a town, consisting of 60,000 Indians, and 10,000 Spaniards. The sterility of the soil did not prevent its being immediately peopled. Corn, fruit, flocks, American stuffs, and European luxuries, arrived from every quarter. In 1738 these mines produced annually near £978,000, without reckoning the silver which was not registered, and what had been carried off by fraud. From that time the produce has been so much diminished, that not above one-eighth part of the coin which was formerly struck, is now made. At all the mines of Peru, the Spaniards, in purifying their gold and silver, use mercury, with which they are supplied from Guanica Velica. The common opinion is, that this mine was discovered in 1564. The trade of mercury was then free; it became an exclusive trade in 1571. At this period all the mines of mercury were shut; and that of Guanica Velica alone was worked; the property of which the king reserved to himself. It is not found to diminish. The mine is dug in the very large mountain of Potosi, sixty leagues from Lima. In its profound abyss are seen streets, squares, and a chapel, where the mysteries of religion on all festivals are celebrated. Millions of flambeaus are continually kept to enlighten it. The mine of Guanica Velica generally affects those who work in it with convulsions; and the other mines, which are not less unhealthy, are all worked by the Peruvians. These unfortunate victims of an insatiable avarice are crowded all together, and plunged naked into these abysses, the greatest part of which are deep, and all excessively cold. Tyranny has invented this refinement in cruelty, to render it impossible for any thing to escape its restless vigilance. If there are any wretches who long survive such barbarity, it is the use of cocoa that preserves them.

We shall incorporate in this chapter, the following interesting account of VOLCANIC ERUPTIONS OF MUD AND SALT, in the Island of Java; by T. S. Goad, Esq. of the Honourable Company's Bengal Civil Service.

"Having received (says the writer) an extraordinary account of a natural phenomenon in the plains of Grobogan, fifty pals (or miles) north-east of Solo, a party, of which I was one, set off from Solo on the eighth of September, 1815, to examine it.

"On approaching the village of Kuhoo, we saw, between two trees in a plain, an appearance like the surf breaking over

rocks, with a strong spray falling to leeward. The spot was completely surrounded by huts, for the manufacture of salt, and at a distance looked like a large village. Alighting, we went to the *Bludugs*, as the Javanese call them. They are situated in the village of Kuhoo, and by Europeans are called by that name. We found them to be on an elevated plain of mud, about two miles in circumference, in the centre of which immense bodies of salt mud were thrown up, to the height of from ten to fifteen feet, in the form of large globes, which, bursting, emitted volumes of dense white smoke. These large globes or bubbles, of which there were two, continued throwing up, and bursting seven or eight times in a minute. At times they throw up two or three tons of mud. We got to leeward of the smoke, and found it to smell like the washing of a gun-barrel.

"As the globes burst, they threw the mud out from the centre with a pretty loud noise, occasioned by the falling of the mud upon that which surrounded it, and of which the plain is composed. It was difficult and dangerous to approach the large globes or bubbles, as the ground was all a quagmire, except where the surface of the mud had become hardened by the sun; upon this we approached cautiously to within fifty yards of the largest bubble, or mud pudding, as it might very properly be called, for it was of the consistency of a custard-pudding, and of very considerable diameter: here and there, where the foot accidentally rested on a spot not sufficiently hardened, it sunk, to the no small distress of the walker.

"We also got close to a small globe or bubble, (the plain being full of them of different sizes,) and observed it closely for some time. It appeared to heave and swell, and when the internal air had raised it to some height, it burst, and fell down in concentric circles, in which shape it remained quiet until a sufficient quantity of air was again formed internally, to raise and burst another bubble. This continued at intervals from about one-half to two minutes. From various other parts of the quagmire round the large globes or bubbles, there were occasionally small quantities of mud shot up like rockets to the height of twenty or thirty feet, and accompanied by smoke. This was in parts where the mud was of too stiff a consistency to rise in globes or bubbles. The mud at all the places we came near was cold on the surface, but we were told it was warm beneath. The water which drains from the mud is collected by the Javanese, and by being exposed in the hollows of split bamboos to the rays of the sun, deposits crystals of salt. The salt thus made is reserved exclusively for the Emperor of Solo. In dry weather it yields thirty *dadjins*, of one hundred *catties* each, every month; but in wet or cloudy weather, less.

"In the afternoon we rode to a place in a forest, called Ram sam, to view a salt lake, a mud hillock, and various boiling, or rather bubbling, pools. The lake was about half a mile in circumference, of a dirty looking water, boiling up all over in gurgling bodies, but more particularly in the centre, which appeared like a strong spring; the water was quite cold, and tasted bitter, salt, and sour, and had an offensive smell. About thirty yards from the lake stood the mud hillock, which was about fifteen feet high from the level of the earth. The diameter of its base was about twenty-five yards, its top about eight feet, and in form an exact cone. The top is open, and the interior keeps constantly working, and heaving up mud in globular forms, like the Blutugs. The hillock is entirely formed of mud which has flowed out of the top; every rise of the mud was accompanied by a rumbling noise from the bottom of the hillock, which was distinctly heard for some seconds before the bubbles burst. The outside of the hillock was quite firm. We stood on the edge of the opening and sounded it, and found it to be eleven fathoms deep. The mud was more liquid than at the Blutugs, and no smoke was emitted from the lake, hillock, or pools.

"Close to the foot of the hillock was a small pool of the same water as the lake, which appeared exactly like a pot of water boiling violently; it was shallow, except in the centre, into which we thrust a stick twelve feet long, but found no bottom. The hole not being perpendicular, we could not sound it with a line.

"About 200 yards from the lake, were several large pools or springs, two of which were eight or ten feet in diameter. They were like the small pool, but boiled more violently, and smelt excessively. The ground around them was hot to the feet, and the air which issued from them quite hot, so that it was most probably inflammable; but we did not ascertain this. We heard the boiling at the distance of thirty yards from the pools, resembling in noise a waterfall. The pools did not overflow; of course the bubbling was occasioned by the rising of air alone. The water of one of the pools appeared to contain a mixture of earth and lime, and, from the taste, to be combined with alkali. The water of the Blutugs and the lake is used medicinally by the Javanese, and cattle drinking of the water are poisoned.

Now follows an account of PITCH-WELLS; from Dr. Holland's Travels in the Ionian Isles, &c.—"The pitch-wells of Zante are a natural phenomenon, which may be regarded as among the antiquities of the isle; since they were known and described as early as the time of Herodotus, and are mentioned since by Pausanias, Pliny, and other authors. They

are situated about ten miles from the city, and near the shore of the bay, on the southern side of the island. We visited this spot, which is called Chieri, a day or two after our arrival in Zante. A small tract of marshy ground, stretching down to the sea, and surrounded on other sides by low eminences of limestone, or a bituminous shale, is the immediate situation of the springs; they are found in three or four different places of the morass, appearing as small pools, the sides and bottom of which are thickly lined with petroleum, in a viscid state, and, by agitation, easily raised in large flakes to the surface. The most remarkable of these pools is one of a circular form, about fifty feet in circumference, and a few feet in depth, in which the petroleum has accumulated to a considerable quantity. The water of the spring, which is doubtless the means of conveying the mineral upwards to the surface, forms a small stream from the pool, sensibly impregnated with bituminous matter, which it deposits in parts as it flows through the morass: the other pools are of similar character. The petroleum is collected generally once in the year; and the average quantity obtained from the springs is said to be about 100 barrels; it is chiefly used for the caulking of vessels, not being found to answer equally well for cordage."

We close this chapter with Mrs. Wakefield's account of her VISIT to a COAL-PIT.—“Near the town of Newcastle, in the county of Northumberland, are vast beds of coal, which lie far beneath the surface of the earth: they are often found at the depth of 100 feet. Our visit to one of them was rather a droll adventure. The first ceremony was, to put on a kind of frock that covered us all over, to prevent spoiling our clothes. We were then shewn a prodigious steam-engine at work, at the mouth of the pit, in order to drain off the water; and close to it, a ventilator for purifying the air in the pit. Our guides now seated us on a piece of board, slung in a rope like the seat of a swing, and hooked to an iron chain, which was let gently down the suffocating hole by the assistance of six horses. I must confess, I did not like this mode of travelling: my spirits were, however, rather cheered when I reached the solid bottom, and saw my friend at my side. He congratulated me on my safe arrival; and pointed to a huge fire, burning for the purpose of keeping the air in proper temperature. Gaining courage by a nearer examination, I walked about the chambers with as much ease as if they had been the apartments of a dwelling-house. The coal is hollowed out in spaces of four yards wide, between which are left pillars of coal to support the roof, ten yards broad, and twenty deep. After exploring a dozen or two of these little apartments, our curiosity was satisfied, as there was nothing more to be seen

but a repetition of the same objects to a vast extent. A number of horses live here for years together, and seem to enjoy themselves very comfortably: they are employed to draw the coal from the subterraneous passages to the bottom of the opening of the pit. The machine which raises the coal to the surface of the earth, is worked by stout horses. The coal is brought in strong baskets, made of osier; they contain each 12 cwt. and while one ascends, the other descends. A man receives these baskets as they arrive at the top, and places them on a dray, having hooked an empty basket on, instead of the full one. Before he drives the dray to a shed at a little distance, where he empties his load, the dust passes through holes prepared to receive it; while the large coals roll down the declivity in heaps, where they are loaded in waggons, and carried to wharfs on the river side, to be put on board the vessels that wait to convey them to distant parts. The waggons, very heavily laden, run without horses to the water side, along a road ingeniously formed in a sloping direction, with grooves to fit the waggon wheels, and make them go more readily. The dust, which is too small for common fires, is put into a kiln well heated, and when it is burnt, the particles unite, and run into large cakes or masses: in that state it is called coke, and this substance is used in many manufactories, where a strong heat is required.

"There are also coal-mines in several other parts of England. Near Whitehaven, in the county of Cumberland, are some that extend half a mile under the sea. The collieries employ a great number of hardy sailors, who, in their frequent coasting-voyages, are accustomed to face all the dangers of a sea-life. In time of war they contribute to man our navy; and, from their courage and skill, form a very valuable part of the crews."

CHAP. XLIV.

CURIOSITIES RESPECTING THE SEA.

General Observations respecting the Sea, or Ocean—Particular Curiosities of the Sea—On the Saltness of the Sea—On the Tides—Waves stilled by Oil.

“ ————— And thou, majestic main,
A secret world of wonders in thyself!
Sound His stupendous praise, whose greater voice
Or bids you roar, or bids your roaring fall !”

GENERAL OBSERVATIONS RESPECTING THE SEA, OR OCEAN.

THE sea, or ocean, is that vast tract of water which encompasses the whole earth. What proportion the superficies of the sea bears to that of the land, is not precisely known, though it is said to be somewhat more than two-thirds. As the waters of the earth must necessarily rise to the surface thereof, it being specifically lighter than the earth, it was necessary there should be large cavities therein, as receptacles to contain them, otherwise they would have overspread all the surface of the earth, and so have rendered it utterly uninhabitable for terrestrial animals: it is well known, that the centre of the earth is the common centre of gravity, and that the nature of fluids is such, that they equally yield to equal powers; hence it follows, that where the power of attraction is every where the same at equal distances from the centre, the superficial parts of the water will every where conform themselves to this attractive power, at an equidistant situation from the centre, and, it is evident, will form the surface of a sphere, so far as they extend. The reason then that the sea seems higher than the land, results from the fallacy of vision, whereby all objects, whether on the land or sea, appear higher as they become more distant: and the reason will be plain to those who are acquainted with optics; for it is well known, that the denser any medium is, through which we behold objects, the greater is the refraction, or the more their images appear above the horizontal level; while the greater the quantity of medium through which the rays pass, the more they will be bent from their first direction: on both these accounts, the appearances of things at a great distance, both on the land and the sea, will be somewhat above the horizon, and the more so as they are the more remote.

With regard to the depth or profundity of the sea, Varenius affirms, that it is in some places unfathomable, in other

places very various, being from fifty yards to four and a half English miles, in some places deeper, and that the depth is much less in bays than in oceans. In general, the depths of the sea bear a great analogy to the height of mountains on the land, so far as discoveries have hitherto extended. It is a general rule among sailors, and is found to hold true in many instances, that the more the shores of any place are steep and high, forming perpendicular cliffs, the deeper the sea is below; and that, on the contrary, level shores denote shallow waters. Thus, the deepest part of the Mediterranean is generally allowed to be under the heights of Malta. And the observation of the strata of earth and other fossils, on and near the shores, may serve to form a good judgment as to the materials to be found in the bottom of the sea; for the veins of salt and bitumen doubtless run on in the same order as we see them on the shore. If we may reason from analogy, the strata of rocks, that serve as a foundation for hills and elevated places on shore, serve also, in the same continued chain, to support the immense quantity of water in the basin of the sea.

The coral fisheries have given occasion to observe, that there are many, and those very large caverns or hollows in the bottom of the sea, especially where it is rocky, and that the like caverns are sometimes found in the perpendicular rocks which form the steep sides of those fisheries. These caverns are often of great depth as well as extent, and have sometimes wide mouths, and sometimes only narrow entrances, into large and spacious hollows.

The bottom of the sea is covered with a variety of materials, such as could not be imagined by any but those who have examined into them, especially in deep water, where the surface only is disturbed by tides and storms; the lower part, and consequently its bed at the bottom, remaining, for ages perhaps, undisturbed. The soundings, when the plummet first touches the ground, on approaching the shores, give some idea of this. The bottom of the plummet is hollowed, and in that hollow there is placed a lump of tallow, which is the first part that touches the ground; and the soft nature of the fat receives into it some part of those substances which it meets with at the bottom: the substances thus brought up, are sometimes pure sand, sometimes a kind of sand made of the fragments of shells beaten to a sort of powder, sometimes they are composed of a like powder to the several sorts of corals, and sometimes they are composed of fragments of rocks; but besides these appearances, which are natural enough, and are what might well be expected, it brings up substances which are of the most beautiful colours.

Dr. Donati, in an Italian work, containing an essay on a

natural history of the Adriatic Sea, has related many curious observations on this subject: having carefully examined the soil and productions of the various countries that surround the Adriatic Sea, and compared them with those which he took up from the bottom of the sea, he found that there was very little difference between the former and the latter. At the bottom of the water there are mountains, plains, valleys, and caverns, similar to those upon land. The soil consists of different strata, placed one upon another, and mostly parallel and correspondent to those of the rocks, islands, and neighbouring continents. They contain stones of different sorts, minerals, metals, various petrified bodies, pumice stones, and lavas formed by volcanoes. One of the objects which most excited his attention, was a crust, which he discovered under the water, composed of crustaceous and testaceous bodies, with beds of polypes of different kinds, confusedly biended with earth, sand, and gravel: the different marine bodies, which form this crust, are found at the depth of a foot or more, entirely petrified, and reduced into marble; these, he supposes, are the natural beds of the sea, and not made so by means of volcanoes and earthquakes, as some have conjectured. On this account, he imagines that the bottom of the sea is constantly rising higher and higher, with which other obvious causes of increase concur; and from this rising of the bottom of the sea, that of its level or surface naturally results; in proof of which, this writer recites a great number of facts.

M. Dassie has been at great pains to prove, that the sea has a general motion, independently of winds and tides, and that it is of more consequence in navigation than is generally supposed. He affirms, that this motion is from east to west; inclining towards the north, when the sun has passed the equinoctial northward, during the time he is passing through the northern signs; but the contrary way, after the sun has passed the said equinoctial southward: adding, that when this general motion is changed, the diurnal flux is changed also; whence it happens, that in several places the tides come in during one part of the year, and go out during the other, as on the coasts of Norway, in the Indies at Goa, Cochinchina, &c. where, while the sun is in the summer signs, the sea runs to the shore; and when in the winter signs, runs from it. On the most southern coasts of Tonquin and China, for the six summer months, the diurnal course runs from the north with the ocean; but the sun having repassed the line toward the south, the course declines also southward.

There are two principal reasons why the sea does not increase by means of rivers, &c. falling every where into it. The first is, because waters return from the sea by subterranean

cavities and aqueducts, through various parts of the earth. Secondly, because the quantity of vapours raised from the sea, and falling on the land, only cause a circulation, but no increase of water. It has been found, by calculation, that in a summer's day there may be raised in vapours, from the Mediterranean Sea, 5,280,000,000 tons of water, and yet this sea receiveth not, from all its nine great rivers, above 1,827,000,000 tons per day, which is but a third part of what is exhausted in vapours.

The ascent of the sea for the formation of springs, by a subterranean circulation of its water to their sources, has been a great objection, with many, against the system which ascribes their origin to the ocean; but Dr. Plot has observed, that there are many ways by which the water may ascend above its own level: 1. By the means of subterranean heat. 2. By filtration. 3. By the unequal height of several seas. 4. By the distance of the centre of magnitude from the centre of gravity in the terraqueous globe; the superficies of the Pacific Sea being said to be further from the centre of gravity than the top of the highest hill on the adverse part of the globe. And, 5. By the help of storms. The sea water actually ascends above its own level, and finds its way into wells, whose bottoms lie higher than the surface of the sea at high-water mark.

We shall now enter more particularly on **THE CURIOSITIES OF THE SEA.**—For the following observations we are principally indebted to Sturm.

“Instead of regarding the sea as an object of terror, let us consider the wonders and the benefits which it presents to us. It must be granted that when the waves swell into mountains, and the tempest roars, its aspect is terrific; and we must be hardy indeed, not to consider it as a most formidable element in such times of awful visitation, when ships, breaking from their anchor, or driven from their course, rush before the winds that beat upon them with ungovernable fury, till, dismasted, and their rigging shivered in fragments, they sink, overwhelmed with a weight of waters, or strike some sand-bank, or shelving rock, and are at once dashed to pieces. Sometimes whirlpools, or vast masses of water with a violently circular motion, whirl the unfortunate vessel that fate urges into their vortex, with irresistible force, till the helpless victim sinks an easy prey to the tremendous gulf, and the cries of the unfortunate wretches are lost in the roar of the waves: these whirlpools are occasioned by rocks in the ocean, and the meeting of numerous currents and eddies. Not less dangerous are the waterspouts, that the wind raises from the sea to the clouds; they hover in the air high above the ocean,

and the wind whirls them round with violence. They often burst with a great crash, and occasion much mischief; for if they fall upon a vessel, they destroy its rigging, and sometimes sink it to the bottom.

“But it would be highly unjust and ungrateful, only to consider the losses occasioned by the sea, without reflecting upon the magnificent and stupendous works of God, and that goodness which even visits the unfathomable depths of the ocean. The first thing that strikes us, upon the investigation of sea water, is its saltness; a pound of the water containing about two ounces of salt. Sea salt appears lighter than that we commonly use, and yet it is not attracted by the air, nor lessened by the continual influx of fresh water; the cause of this is unknown. If this peculiar quality arose from mountains of salt contained in the sea, it would be salter in some places than in others, of which we have no proof. But whatever is the occasion of this saline property of the sea, it is absolutely necessary to accomplish certain ends. It is that which preserves such a vast body of water from corruption, and renders it capable of supporting a greater weight. The colour of sea water is also deserving of attention: it is not every where alike, which perhaps arises in part from its reflecting the colour of the bottom and that of the sky. It often appears dark and black in deep abysses, white and foaming during a storm, silvery, and gilded with reflections of the most beautiful hue, when the last rays of the setting sun play upon the unruffled surface: the colour of the sea, in addition to these, varies, from numberless insects, marine plants, and the combination of the different substances which the rivers and torrents carry with them into the ocean. When it is calm, and not a breeze skims over its bosom, it sometimes glitters with the most brilliant stars; and the track of a ship cleaving the waves has often a luminous appearance, like a river of fire.

“The creatures which inhabit the sea excite our surprise and admiration; we there discover a new world, and the number of beings which compose it is prodigious. Aquatic animals are not so numerous in their species as the land animals; but they surpass them in size and duration. The elephant and ostrich yield in bulk to the whale, the largest fish of the ocean, its length being often from sixty to seventy feet; and no land animal can vie with it in longevity, for it lives as long as the oak. If we may rely upon certain accounts, there are creatures in the ocean, far exceeding the size of the whale; as the animal called kraken, said to exist in the northern seas, and whose circumference is half a German league. Who is able to number the different species of animals which people the seas? or who can determine their form, structure, size, and

properties? How infinitely great is that God who has created the sea! will be the conclusion of all who investigate the subject, and it is not without the wisest reasons that the Creator has made the ocean and the seas to occupy two-thirds of the whole globe. The seas were designed not only to form great reservoirs of water, but by means of their evaporation to be the sources of rain, snow, and various meteors. What wisdom is displayed in the connection which the seas have with each other, and in their continual motion! And it is not less wonderful that the bottom of the ocean is of the same nature as the surface of the earth. There are found in the sea, rocks, caverns, plains, springs, plants, and animals; and the islands are only the summits of a long chain of mountains. When we consider that the seas form a part of the globe the least investigated, we are disposed to believe that they contain many more wonders, which neither the senses nor the understanding of man can penetrate, while all acknowledge the adorable wisdom and power of the Most High. To Him then, who has established the monuments of his grandeur and the sceptre of his glory in the ocean, as upon the earth, be ascribed all admiration and praise!"

The following opinions of a late celebrated philosopher and divine, ON THE SALTNESS OF THE SEA, may not be unacceptable to our readers:—"There are few questions, (observes Bishop Watson,) respecting the natural history of our globe, which have been discussed with more attention, or decided with less satisfaction, than that concerning the primary cause of the saltness of the sea. The solution of it had perplexed the philosophers before the time of Aristotle; it surpassed his own great genius; and those of his followers, who have attempted to support his arguments, have been betrayed into very ill-grounded conclusions concerning it. Father Kircher, after having consulted three and thirty authors upon the subject, could not help remarking, that the fluctuations of the ocean itself were scarcely more various than the opinions of men concerning the origin of its saline impregnation. The question does not seem capable of admitting an illustration from experiment; at least no experiments have hitherto been made for that purpose, and therefore we may be the less surprised at its remaining nearly as problematical in the present age, as it has been in the preceding. Had there, indeed, been any observation made three or four centuries ago, ascertaining the saltness of the sea at any particular time and place; we might, by similar observations at the same place and the same season, have been able to know whether the saltness at that particular place was an increasing, decreasing, or an invariable quantity; and this kind and degree of know-

ledge would have served as a clue to direct us to a full investigation of this matter in general; but it is to be regretted, that no such observations have, till very lately, been made with any tolerable precision.—There are three principal opinions on this subject, which have been maintained by philosophers of modern date; some, observing that river water, almost in every part of the globe, is in a greater or less degree impregnated with sea salt, have thought that the sea has gradually acquired its present quality of salt from the long-continued influx of rivers.

Other philosophers, observing that large beds of fossil salt are not unfrequent in any quarter of the globe; and conceiving, with great probability, the bottom of the sea to be analogous in its formation to the surface of the earth, have undertaken to derive its saltness from the beds of rock salt, which they have supposed to be situated at its bottom; and they are further of opinion, that without such a permanent saline principle, the sea would long since have become insipid from the fresh water poured into it by an infinity of rivers. Strange! that what, according to the fore-mentioned hypothesis, was thought sufficient to account for the saltness of the sea, should in this be esteemed instrumental in annihilating the saltness already supposed to exist.

Boyle unites, as it were, and takes the two preceding hypotheses, and imagines the saltness of the sea to be supplied, not only from rocks and other masses of salt, which at the beginning were, and in some countries may yet be found, either at the bottom of the sea, or at the sides, where the water can reach them, but also from the salt which the rivers, rains, and other waters, dissolve in their passage through divers parts of the earth, and at length carry with them into the sea. Buffon, and the generality of philosophers, acquiesce in the opinion of Boyle.—“After all, (says he,) it may be observed, that we are inquiring into the cause of a phenomenon, which it may be said had no secondary cause at all. It is taken for granted, in this disquisition, that the water which covered the globe in its chaotic state, was not impregnated with salt as at present, but quite fresh: now this is an opinion concerning a matter of fact, which can never be proved either way; and surely we extend our speculations very far, when we attempt to explain a phenomenon, primeval to, or coeval with, the formation of the earth.”

This sensible writer then states the different experiments which have been made to discover the saltness of the sea, round the shores of Britain; and proposes the following simple method of ascertaining it with tolerable certainty:—

“As it is not every person who can make himself expert in the use of common means of estimating the quantity of salt

contained in sea water, I will mention a method of doing it, which is so easy and simple, that every common sailor may understand and practise it; and which, at the same time, from the trials I have made of it, seems to be as exact a method as any that has yet been thought of.—Take a clean towel, or any other piece of cloth; dry it well before the sun or before the fire, then weigh it accurately, and note down its weight; dip it in the sea water, and, when taken out, wring it a little, till it will not drip when hung up to dry; weigh it in this wet state, then dry it in the sun or at the fire, and when it is perfectly dry, weigh it again: the excess of the weight of the wetted cloth above its original weight, is the weight of the sea water imbibed by the cloth; and the excess of the weight of the cloth after being dried, above its original weight, is the specific gravity of the salt retained by the cloth; and by comparing this weight with the weight of the sea water imbibed by the cloth, we obtain the proportion of salt contained in that species of sea water.”

Whoever undertakes to ascertain the quantity of salt contained in sea water, either by this or any other method, would do well to observe the state of the weather preceding the time when the sea water is taken out of the sea; for the quantity of salt contained in the water near the surface, may be influenced, both by the antecedent moisture, and the antecedent heat of the atmosphere. And this leads to the consideration of a question proposed by Aristotle,—Why are the upper parts of the sea salter and warmer than the lower? Some philosophers, admitting the fact, have followed him in attempting to explain it; whilst others have thought themselves authorized by experiment to deny the truth of the position; and those, perhaps, will argue with the greatest justness, who shall affirm that it is neither generally to be admitted, nor generally to be rejected, but that the sea in some places, and under certain circumstances, is salter and warmer at the surface, than at any considerable depth beneath it, while in many others the reverse is true. The question consists of two parts, betwixt which, though there probably is a connection, yet it is not so necessary a one as to hinder us from considering each part by itself.

With regard to the use of this salt property of sea water, it is observed, that the saltiness of the sea preserves its waters pure and sweet, which otherwise would corrupt, and emit a stench like a filthy lake, and consequently that none of the myriads of creatures which now live therein could exist. From thence also the sea water becomes much heavier, and therefore ships of greater size and burden are safely borne thereon. Salt water also does not freeze so soon as fresh water, hence the seas are more free for navigation

We shall now make a few observations on THE TIDES:—

Say, why should the collected main
Itself within itself contain?

Why to its caverns should it sometimes *cree*

And with delighted silence sleep

On the lov'd bosom of its parent deep?

Why should its num'rous waters stay

In comely discipline and fair array,

Till winds and tides exert their high commands?

Then prompt and ready to obey,

Why do the rising surges spread

Their op'ning ranks o'er earth's submissive head,

Marching through different paths to different lands? *Prior.*

The tides consist of two periodical motions of the waters of the sea, called the flux and reflux, or the flow and ebb. The cause of the tides is the attraction of the sun and moon, but chiefly of the latter; the waters of the immense ocean, forgetful, as it were, of their natural rest, move and roll in tides, obsequious to the strong attractive power of the moon, and weaker influence of the sun.

That the tides may have their full motion, the ocean in which they are produced ought to be extended from east to west 90°, or a quarter of a great circle of the earth, at least; because the places where the moon raises most, and most depresses the water, are at that distance from one another. Hence it appears, that it is only in the great oceans that such tides can be produced, and why, in the large Pacific ocean, they exceed those in the Atlantic. From this it is also obvious why the tides are not so great in the torrid zone, between Africa and America, where the ocean is narrower, as in the temperate zones on either side; and from this also, we may understand why the tides are so small in islands that are very far distant from the shore. It is manifest, that, in the Atlantic ocean, the water cannot rise on one shore, but by descending on the other; so that, on these shores, at an intermediate distance, it must continue at about a mean height between its elevation on the one, and descent on the other shore. As the tides pass over shoals, and run through streights into bays of the sea, their motion becomes more various, and their height depends on a great many circumstances. The tide that is produced in the western coast of Europe corresponds to the theory above described: thus, it is high water on the coast of Spain, Portugal, and the west of Ireland, about the third hour after the moon has passed the meridian; from thence it flows into the adjacent channels, as it finds the easiest passage. One current from it, for example, runs up by the south of England, and another comes in by the north of Scotland: they take a considerable time to move all this way and it is high water sooner in the places to

which they first come; and the tides even begin to fall at those places, while the two currents are yet going on to others that are further in their course. As they return, they are not able to raise a tide; because the water runs faster off than it returns, till by a new tide propagated from the ocean, the return of the current is stopped, and the water begins to rise again. The tide takes twelve hours to come from the ocean to London bridge, so that, when it is high water there a new tide is already come to its height in the ocean; and, in some intermediate place, it must be low water at the same time.

In channels, therefore, and narrow seas, the progress of the tides may be, in some respects, compared to the motion of the waves of the sea. It may be observed, that when the tide runs over shoals, and flows upon flat shores, the water is raised to a greater height than in the open and deep oceans that have steep banks; because the force of its motion cannot be broken upon these level shores, till the water rises to a greater height. If a place communicates with two oceans, (or two different ways with the same ocean, one of which is a readier and easier passage than the other,) two tides may arrive at that place in different times, which, interfering with each other, may produce a greater variety of phenomena.

An extraordinary instance of this kind is mentioned at Bathsha, a port in the kingdom of Tonquin in the East Indies, of northern latitude $20^{\circ} 50'$. The day in which the moon passes the equator, the water stagnates there without any motion: as the moon removes from the equator, the water begins to rise and fall once a day; and it is high water at the setting of the moon, and low water at her rising. This daily tide increases for about seven or eight days, and then decreases for as many days by the same degrees, till this motion ceases when the moon has returned to the equator. When she has passed the equator, and declines towards the south pole, the water rises and falls again, as before; but it is high water now at the rising, and low water at the setting, of the moon.

We shall close this chapter with an account of the remarkable fact of WAVES STILLED BY OIL.—This wonderful property, though well known to the ancients, as appears from the writings of Pliny, was for many ages either quite unnoticed, or treated as fabulous by succeeding philosophers, till Dr. Franklin again attracted the attention of the learned to this subject; though it appears, from some anecdotes, that seafaring people have always been acquainted with it. Mr. Pennant, in his *British Zoology*, vol. iv. under the article

Seal. takes notice, that when these animals are devouring a very oily fish, which they always do under water, the waves above are remarkably smooth; and by this the fishermen know where to find them. Sir Gilbert Lawson, who served long in the army at Gibraltar, assured Dr. Franklin, that the fishermen in that place are accustomed to pour a little oil on the sea, in order to still its motion, that they may be enabled to see the oysters lying at its bottom, which are there very large, and which they take up with a proper instrument. A similar practice is followed among fishermen in various other parts; and Dr. Franklin was informed by an old sea captain, that the fishermen of Lisbon, when about to return into the river, if they saw too great a surf upon the bar, would empty a bottle or two of oil into the sea, which would suppress the breakers, and allow them to pass freely. The Doctor having revolved in his mind all these pieces of information, became impatient to try the experiment himself. At last, having an opportunity of observing a large pond very rough with the wind, he dropped a small quantity of oil upon it. But having at first applied it on the lee side, the oil was driven back again upon the shore. He then went to the windward side, and poured on about a tea-spoonful of oil; this produced an instant calm over a space several yards square, which spread amazingly, and extended itself gradually till it came to the lee-side; making all that quarter of the pond, perhaps half an acre, as smooth as glass. This experiment was often repeated in different places, and was always attended with success.



CHAP. XLV.

CURIOSITIES RESPECTING THE SEA.—(*Concluded.*)

“ ————— Adoring, own
The hand Almighty, who its channel'd bed
Immeasurable sunk, and pour'd abroad,
Fenc'd with eternal mounds, the fluid sphere;
With every wind to waft large commerce on,
Join pole to pole, consociate sever'd worlds,
And link in bonds of intercourse and love
Earth's universal family.”

ON THE PERFECTION OF NAVIGATION.

THE following account of the present wonderful perfection of navigation, is taken from a History of Voyages and Discoveries made in the North; translated from the German of John Reinhold Foster, LL.D.—

"Of all the arts and professions which have at any time attracted notice, none has ever appeared to be more astonishing and marvellous than that of navigation, in the state in which it is at present; an art which doubtless affords one of the most certain irrefragable proofs of the amazing powers of the human understanding. This cannot be made more evident, than when, taking a retrospective view of the tottering inartificial craft to which navigation owes its origin, we compare it to a noble and majestic edifice, containing 1000 men, together with their provisions, drink, furniture, wearing-apparel, and other necessaries, for many months, besides 100 pieces of heavy ordnance; and bearing all this vast apparatus safely, and as it were on the wings of the wind, across immense seas to the most distant shores. The following example may serve for the present to delineate at full length, as it were, the idea above alluded to. But first I must premise, that a huge unwieldy log of wood, with the greatest difficulty, and in the most uncouth manner, hollowed out in the inside, and somewhat pointed at both ends, and in this way set on a river for the purpose of transporting two or three persons belonging to one and the same family, across a piece of water a few feet deep, by the assistance of a pole pushed against the ground, cannot with any propriety be considered as the image of navigation in its first and earliest stage. For it seems evident to me, that people in the beginning only took three or four trunks of trees, and fastened them together, and then, by means of this kind of raft, got across such waters as were too deep for them to ford, and across which they could not well swim, with their children, and various kinds of goods which they might wish to preserve from being wet. The canoe, however, is a specimen of the art in a more advanced state, as this kind of craft is capable of having direction given to it, and even of so capital an improvement as that of having a sail added to it. For this reason I choose this vehicle for a standard, in preference to a mere raft, to which, imperfect as it is, it is so much superior.

"Let us, then, compare this with a large majestic floating edifice, the result of the ingenuity and labour of many hundreds of hands, and composed of a number of well-proportioned pieces, nicely fastened together by iron nails and bolts; and rendered so tight with tow and pitch, that no water can penetrate it. Now, in order to give motion and direction to this enormous machine, some astonishingly lofty pieces of timber have been fixed upright in it, and so many moveable cross pieces have been added to it, together with such a variety of pieces of strong linen cloth, for the purpose of catching the wind, and of receiving its impulse and propelling power, that the number of them amounts to upwards of thirty. For chang-

ing the direction of the yards and sails, according to particular circumstances, it has also been requisite to add a vast quantity of cordage and tackling; and nevertheless, even all this would not be sufficient for the perfect direction and government of the vessel, if there were not fastened to the hinder part of it, by means of hinges and hooks, a moveable piece of wood, very small indeed, in proportion to the whole machine, but the least inclination of which to either side is sufficient to give immediately a different direction to this enormously large mass, and that even in a storm, so that two men may direct and govern this swimming island with the same, or with greater ease, than a single man can do a boat. But if, besides, we consider, that, in a vessel like this, not a single piece is put in at random, but that every part of it has its determinate measure and proportion, and is fixed precisely in that place which is the most advantageous for it; that, throughout every part of it, there is distributed an astonishing quantity of blocks, stays, and pulleys, for the purpose of diminishing the friction and of accelerating the motion of these parts; that even the bellying and vaulted part of the fabric, together with its sharp termination underneath, are proportioned according to the nicest calculations, and the most accurately determined rules; that the length and the thickness of the masts, the size of the booms and yards, the length, width, and strength of the sails and tackling, are all in due proportion to each other, according to certain rules founded upon the principles of motion: when we consider all this, I say, our admiration increases more and more at this great masterpiece of human power and understanding.

“ Still, however, there are wanting a few traits to complete this description. A man in health consumes, in the space of twenty-four hours, about eight pounds of victuals and drink: consequently, 8000lb. of provisions are required daily in such a ship. Now, let us suppose a ship to be fitted out for three months only, and we shall find that she must be laden with 720,000lb. of provisions. A large forty-two pounder weighs about 6100lb. if made of brass, and about 5500lb. if iron; and generally there are twenty-eight or thirty of these on board a ship of 100 guns, the weight of which, exclusive of that of their carriages, amounts to 183,000lb.—on the second deck, thirty twenty-four pounders, each of which weighs about 5100lb. and therefore altogether 153,000lb.—the weight of the twenty-six or twenty-eight twelve-pounders on the lower deck, amounts to about 75,400lb.—that of the fourteen six-pounders on the upper deck, to about 26,600lb.—besides which, on the round tops, there are even three-pounders and swivels. Now, if to this we add, that the complete charge of a forty-two pounder weighs about 64lb. and that at least upwards of 100

charges are required for each gun, we shall find this to amount nearly to the same weight as the guns themselves. In addition to this, we must reflect, that every ship must have, by way of providing against exigencies, at least a second set of sails, cables, cordage, and tacklings, which altogether amount to a considerable weight. The stores, likewise, consisting of planks, pitch, and tow; the chests belonging to the officers and sailors; the surgeon's stores, and various other articles requisite on a long voyage; as also the small arms, bayonets, swords, and pistols, are no inconsiderable load; to which we must finally add the weight of the crew, which is not very trifling: so that one of these large ships carries at least 2162 tons burden, or 4,324,000lb. and at the same time is steered and governed with as much ease as the smallest boat. Now, the consideration of these circumstances alone, is sufficient to excite the most serious reflections in a contemplative mind; and yet, if such a ship sailed along the coast only, and never lost sight of the shore, as the navigators of old used to do, we might still be tempted to look upon navigation as an easy and trifling business. But the finding the straightest and shortest way over an ocean of more than sixty or eighty degrees in longitude, and thirty or forty in latitude; or across a track from 4000 to 6000 miles in extent, by day and by night, in fair weather or in foul; as well when the sky is overcast as when it is clear, and often with no other guide than the compass, and the being able to determine the true position of the ship at sea, by the height of the sun, though this latter be enveloped in clouds, or to direct its course by the moon and stars with such exactness and precision, as not to make a mistake of the value of half a degree, or thirty miles; this at least shews the progress and great perfection of an art practised by a class of people, of whose understanding many conceited and supercilious landmen have but a mean opinion, and whose plain and simple manners they frequently take the liberty of turning into ridicule, forgetting how much they are indebted to their skill and prowess.

"A violent storm of wind will make us tremble with fear, even in a strong well-built house, and in the midst of a populous city; yet we have seldom or never either seen or experienced the vast power of the enraged waves, when beat about by the winds, and dashed against each other till they seem transformed into froth and vapour, and the whole surface of the ocean presents to the eye a confused scene of immense watery mountains and bottomless precipices; and yet on such a sea as this the true seaman, provided he has but a good ship, rides with calm and unshaken courage, and thinks himself as safe in the midst of the ocean as in the best fortified castle."

With gallant pomp and beauteous pride,
 The floating pile in harbour rode;
 Proud of her freight, the swelling tide
 Reluctant left the vessel's side,
 And rais'd it as it flow'd.

The waves, with eastern breezes curl'd,
 Had silver'd half the liquid plain;
 The anchors weigh'd, the sails unfurl'd,
 Serenely mov'd the wooden world,
 And stretch'd along the main.

CHAP. XLVI.

CURIOSITIES RESPECTING WATERFALLS, LAKES, GULFS, WHIRLPOOLS, &c.

*The Falls of Niagara—Lake of Killarney—Lake Solfatara—
 Whirlpool near Suderoc—Maelstrom—Gulf Stream—New
 Island starting from the Sea.*

Fountains and ponds he adds, and lakes immense,
 Descending streams the winding borders fence;
 This, deep-absorb'd, the darksome cavern laves,
 These to the ocean roll their azure waves;
 There, uncontroll'd, they meet the roaring tide,
 And dash, for verdant banks, the hoar cliff's side.

Ovid.

NIAGARA is a river of the United States, which flows from Lake Erie, and runs by a north-west course into the south-west end of Lake Ontario, constituting part of the boundary between the United States and Canada. It is thirty-four miles long, including its meanders. About twenty miles below Lake Erie is the great cataract, called THE FALLS OF NIAGARA, which is justly reckoned one of the greatest natural curiosities in the world. These falls run from south-south-east to north-north-west; and the rock of the falls crosses them, not in a right line, but forms a kind of figure like a hollow semicircle, or horse-shoe. Above the falls, in the middle of the river, is an island called Grand Isle, about nine hundred or one thousand feet long, the lower end of which is just at the perpendicular edge of the fall. On both sides of this island runs all the water that comes from the lakes of Canada; viz. Lakes Superior, Michigan, Huron, and Erie. Before the water comes to this island, it runs but slowly, compared with its motion afterwards, when it grows the most rapid in the world, running with a surprising swiftness before it comes to the fall. It is perfectly white, and in many places is thrown high up into the air. At this island, the river divides into two chan-

nels: the perpendicular descent of the north-east channel, as measured by Dr. M'Causlin, is one hundred and sixty-three feet; that of the north-west, one hundred and forty-three; and the breadth of the cataract and island, above a mile.

The water that runs down on the west side is more rapid, flows in greater abundance, and is whiter, than that on the east side, and seems to outfly an arrow in swiftness. At the principal fall, on looking up the river, one may see that the water is every where exceedingly steep, almost like the side of a hill; but upon looking at the fall itself, it is impossible to express the amazement it occasions. The height of it, as measured by mathematical instruments, is exactly one hundred and thirty-seven feet; and when the water is come to the bottom, it rebounds back to a very great height in the air. The noise is heard at the distance of forty-five miles. At fort Niagara, when they hear the noise of the fall more loud than ordinary, they are sure that a north-east wind will follow; which is the most surprising, as the fort lies south-west from the fall. Sometimes the fall makes a much greater noise than at others, and this is held for an infallible sign of approaching rain or bad weather. From the place where the water falls, there arises a great quantity of vapour, like very thick smoke, insomuch, that when viewed at a distance, one would think that the Indians had set the forests on fire. These vapours rise high in the air when it is calm, but are dispersed by the wind when it blows hard. In September and October, such quantities of dead water-fowl are found every morning below the fall, on the shore, that the garrison of the fort live chiefly upon them. Besides the fowls, they find several sorts of dead fish, also deer, bears, and other animals, which have tried to cross the water above the fall: the larger animals are generally found broken to pieces. Just below, a little way from the great fall, the water is not rapid, but goes in circles, and whirls like a boiling pot; which however does not hinder the Indians going upon it in small canoes a fishing; but a little further, and lower, the other smaller falls begin.

There is an island in the middle of the river above the fall, where the Indians go often to kill deer, which have tried to cross the river, and are driven upon it by the stream. On the west side of this island are some small islands or rocks of no consequence. The east side of the river is almost perpendicular, the west side more sloping. In former times, a part of the rock, at the fall which is on the west side of the island, hung over in such a manner, that the water which fell perpendicularly from it, left a vacancy below, so that people could go under between the rock and the water; but the prominent part some years ago broke off, and fell down. The breadth of

the great fall, as it runs in a semicircle, is reckoned to be about 300 feet. Below the fall, in the holes of the rocks, are great plenty of eels; which the Indians and French catch with their hands. Every day, when the sun shines, may be seen from ten A. M. till two P. M. below the fall, a glorious rainbow, and sometimes two, one within the other. The more vapours that float, the brighter and clearer is the rainbow. When the wind carries the vapours from that place, the rainbow is gone, but appears again as soon as new vapours arise. From the fall to the landing above it, where the canoes from the Lake Erie put ashore, (or from the fall to the upper end of the carrying place,) is half a mile. Lower than this, the canoes dare not venture. They have often found below the fall, fragments of human bodies, that have unhappily been precipitated over the fall. The French say, that they have often thrown great trees into the water above, to see them carried over this precipice with the vast body of water, which nothing can resist: these go down with surprising swiftness, but can never be seen afterwards; from whence has arisen the conjecture that there was a bottomless abyss just under the fall. But the most reasonable supposition is, that, by the powerful agency of the water, they were broken into such diminutive fragments, as to render it impossible that they should ever be recognized for the same. The rock of the fall is composed of a gray limestone.

We shall next take a view of some of the most remarkable lakes; and the first we would notice, is the LAKE OF KILLARNEY.—This is a beautiful lake of Ireland, in the county of Kerry, otherwise called LOUGH LEAN, from its being surrounded by high mountains. It is divided into three parts, called the Lower, Middle, and Upper Lake. The northern, or lower lake, is six miles in length, and from three to four in breadth. On the side of one of the mountains is O'Sullivan's Cascade, which falls into the lake with a roar that strikes the timid with awe. The view of this sheet of water is uncommonly fine; it appears as if it were descending from an arch of wood, which overhangs it above seventy feet in height. The promontory of Mucruss, which divides the upper from the lower lake, is quite enchanting; and a road is carried through the centre of its promontory, which unfolds all the interior beauties of the place. Among the distant mountains, Turk appears an object of magnificence; while Mangerton's more lofty, though less interesting summit, soars above the whole. The passage to the upper lake is round the extremity of Mucruss, which confines it on one side, and the approaching mountains on the other. Here is a celebrated rock, called the Eagle's Nest, which produces wonderful echoes; the

report of a single cannon is answered by a succession of peals resembling the loudest thunder, and at length dies away among the distant mountains. The upper is four miles long, and from two to three broad. It is almost surrounded by mountains, from which descend a number of beautiful cascades. The islands in this lake are numerous, and afford an amazing variety of picturesque views. The centre lake, which communicates with the upper, is small in comparison with the other two, and cannot boast of equal variety; but the shores are, in many places, indented with beautiful bays, surrounded by dark groves of trees. The east boundary is formed by the base of Mangerton, down the steep side of which descends a cascade, visible for 150 yards. This fall of water is supplied by a circular lake, near the summit of the mountain, called the Devil's Punch Bowl; which, on account of its immense depth, and the continual overflow of water, is considered as one of the greatest curiosities in Killarney. One of the most delightful prospects which this universally admired lake affords, is from a rising ground near the ruined cathedral of Aghadoe.

LAKE SOLFATARA.—This lake is in the Compagna of Rome, near Tivoli, anciently called Albulus. It has what are called three floating islands, but they are only apparently so, being composed of bunches of sedges and bulrushes, glued together by the bitumen which swims on the lake, and the sulphur with which it is impregnated, and covered with sand and dust blown from the adjacent banks of the lake. These islands are from twelve to fifteen yards long, and the soil is strong enough to bear six persons, who, by a pole, may move to different parts of the lake. This lake has an outlet, whence its waters run, forming a whitish muddy stream, into the Teverone, the ancient Anio, emitting a vapour of a sulphureous smell as they flow. The ground near this rivulet, as well as on the banks of the lake, resounds with a hollow sound when a horse gallops over it. The water has also a petrifying quality, covering every substance that it passes over with a hard white stony substance. On throwing a bundle of sticks or shrubs into the lake, they will in a few days be covered with this stony crust; and this petrifying quality is even stronger in the rivulet that runs from it, than in the lake itself, and still increases till it falls into the Teverone. These small white incrustations that cover the pebbles in the bottom of the lake and rivulet, being somewhat like sugar-plums, are called Confections of Tivoli. Fish abound in the Teverone above and below Tivoli, till it receives the petrifying water; after which, during the remainder of its course to the Tiber, there are none.

Our next object of curiosity is a WHIRLPOOL near SUDEROE. —Suderoe is one of the Fero isles, situated to the north of Scotland. Near this place there is a remarkable whirlpool, occasioned by a crater sixty-one fathoms deep in the centre, and from fifty to fifty-five on the sides. The water forms four fierce circumgyrations. The point they begin at is on the side of a large bason, where commences a range of rocks, running spirally, and terminating at the verge of the crater. This range is extremely rugged, and covered with water, from the depth of twelve to eight fathoms only. It forms four equidistant wreaths, with a channel from thirty-five to twenty fathoms deep between each. On the outside, beyond that depth, the sea suddenly sinks to eighty and ninety. On the south border of the bason is a lofty rock, called Sumboe Munk, noted for the multitude of birds which frequent it. On one side the water is only three or four fathoms deep, on the other fifteen. The danger at most times, especially in storms, is very great. Ships are irresistibly drawn in; the rudder loses its power; and the waves beat as high as the masts; so that an escape is almost miraculous: yet at the reflux, in fine weather, the inhabitants venture for the sake of fishing.

Our next subject is the celebrated MAELSTROM.—This is a very dangerous whirlpool on the coast of Norway, in the province of Nordland, and district of Lofoden, near the island of Moskoe, whence it also has its name of Moskoe-strom. Of this amazing whirlpool, Jonas Ramus gives the following account:—"The mountain of Helseggen, in Lofoden, lies a league from the island of Ver, and betwixt these two runs that large and dreadful stream called Moskoe-strom, from the island of Moskoe, which is in the middle of it; together with several circumjacent isles, as Ambaaran, half a quarter of a league north, Iflesen, Hoeholm, Kiedholm, Suarven, and Buckholm. Moskoe lies about half a quarter of a mile south of the island of Ver, and betwixt them these small islands, Otterholm, Flimen, Sandfiesen, and Stockholm. Betwixt Lofoden and Moskoe, the depth of the water is between thirty-six and forty fathoms; but on the side towards Ver, the depth decreases so as not to afford a convenient passage for a vessel, without the risk of splitting on the rocks, which sometimes happens even in the calmest weather: when it is flood, the stream runs up the country between Lofoden and Moskoe with a boisterous rapidity; but the roar of its impetuous ebb to the sea is scarce equalled by the loudest and most dreadful cataracts, the noise being heard several leagues off; and the vortices, or pits, are of such an extent and depth, that if a ship comes within its attraction, it is inevitably absorbed and carried down to the bottom, and there beaten to pieces against

the rocks; and when the water relaxes, the fragments thereof are thrown up again: but these intervals of tranquillity are only at the turn of the ebb and flood, in calm weather, and last but a quarter of an hour, its violence gradually returning. When the stream is most boisterous, and its fury heightened by a storm, it is dangerous to come within a Norway mile of it; boats, ships, and yachts, having been carried away, by not guarding against it before they were within its reach. It likewise happens frequently, that whales come too near the stream, and are overpowered by its violence; and then it is impossible to describe their howlings and bellowings, in their fruitless struggles to disengage themselves. A bear, once attempting to swim from Lofoden to Moskoe, with a design of preying upon the sheep at pasture in the island, afforded the like spectacle to the people; the stream caught him, and bore him down, whilst he roared terribly, so as to be heard on shore. Large stocks of fir and pine trees, after being absorbed by the current, rise again, broken and torn to such a degree as if bristles grew on them. This plainly shews the bottom to consist of craggy rocks, among which they are whirled to and fro. This stream is regulated by the flux and reflux of the sea, it being constantly high and low water every six hours. In 1645, early in the morning of Sexagesima Sunday, it raged with such noise and impetuosity, that on the island of Moskoe, the very stones of the houses fell to the ground. When this whirlpool is agitated by a storm, its vortex will reach vessels five or six miles distant."

GULF-STREAM.—This is a remarkable current in the ocean, which runs along the coast, at unequal distances, from Cape Florida to the Isle of Sables and the banks of Newfoundland, where it turns off and runs through the Western Islands, thence to the coast of Africa, and along that coast in a southern direction till it arrives at and supplies the place of those waters carried by the constant trade-winds from the coast of Africa towards the west; thus producing a constant circulating current. This stream is about seventy-five miles from the shores of the southern states, and the distance increases as you proceed northward. The breadth of it is about forty or fifty miles, widening towards the north. Its common rapidity is three miles an hour. A north-east wind narrows the stream, renders it more rapid, and drives it nearer the coast. North-west and west winds produce a contrary effect. The Gulf-stream is supposed to be occasioned by the trade-winds, that are constantly driving the water to the westward, which being compressed in the gulf of Mexico, finds a passage between Florida and the Bahama islands, and runs to the north-east along the American coast.

A chart of this Gulf-stream was published by Dr. Franklin, in 1768, principally from the information of Captain Folger. This was confirmed by the ingenious experiments of Dr. Blagden, published in 1781, who found that the water of the gulf-stream was from six to eleven degrees warmer than the water of the sea, through which it runs; which must have been occasioned by its being brought from a hotter climate.

We close the present chapter with an ACCOUNT OF A NEW ISLAND EMERGING FROM THE SEA.—The description is taken from the *Edinburgh Review*, No. 46, September, 1814.

In the neighbourhood of Oonalashca, which is situated about the centre of the Alentian chain, a new island, nearly twenty miles in circumference, has been formed within these twenty years. The following is the account of it, which M. Lisiansky collected from eye-witnesses at Cadinck :—

“In the evening, while I was alone, employed in writing the memorandums of my journal, a Russian introduced himself, who had resided on the island of Oonalashca, when a new island started up in its vicinity. I had heard of this phenomenon, and was therefore desirous to learn what he knew respecting it. He said, that about the middle of April, 1797, a small island was seen where none had been seen before: that the first intimation of its appearance had been brought by some Alentians to Captain's Harbour, who, returning from fishing, observed a great smoke issuing out of the sea: that this was the smoke of the volcano, which was then gradually rising above the surface of the sea, and which, in May, 1798, burst forth with a blaze, that was distinctly seen from a settlement called Macooshina, on the island of Oonalashca; at the distance of no less than forty miles to the north-west. This new island is tolerably high, and about twenty miles in circumference. It has been remarked, that it has not increased in size since the year 1799; and that no alteration has taken place in its appearance, except that some of the highest points have been thrown down by violent eruptions.”

CHAP. XLVII.

*CURIOSITIES RESPECTING BURNING SPRINGS.**Naphtha Springs—Burning Springs in Kentucky—Hot Springs of Iceland—Hot Springs of Ouachitta—Other Burning Springs*

"Adored Artificer! what skill divine,
What wonders, in the wide creation shine!"

NAPHTHA SPRINGS.—Dr. James Mounsey, and Jonas Hanway, Esq., have given a particular account of these springs. Both gentlemen, by their travels, their residence in Muscovy, and their acquaintance with several people who have been upon the spot, have had great opportunities of becoming perfectly informed of every thing relating to the subject; and whose judgment and veracity may be depended on. Both their accounts agree, that on the western coast of the Caspian Sea, not far from the city of Baku, there is a large spot of ground, where, on taking off two or three inches of the surface of the earth, and then applying a live coal, and blowing, a flame immediately issues forth, without either burning the reed or paper, provided the edges be covered with clay. This method supplies the want of candle in their houses. Three or four of these will also boil water in a pot, and they dress their victuals in this way. The flame may be blown out like that of a lamp, but otherwise it continues burning; it smells somewhat sulphureous, or rather like naphtha, but very little offensive. The ground is dry and stony, and the more stony the ground, the stronger and clearer the flame. Near this place they dig out brimstone, and here are also the naphtha springs. But the chief place for naphtha is Swieten Island, a small tract of land on the western coast of the Caspian Sea, and uninhabited, except at such seasons as they fetch naphtha from thence, which the Persians load in their wretched embarkations, without barrels or any other vessels, so that sometimes you see the sea covered with it for leagues together. The springs boil up highest in thick and heavy weather, and the naphtha sometimes takes fire on the surface, and runs lighted or burning into the sea in great quantities, and to great distances. In clear weather, it does not bubble above two or three feet. People make cisterns near the springs, into which they convey what overflows by troughs, taking off the naphtha from the surface, under which there is a mixture of water, or some other heavier fluid. The greater part is of a

dark gray colour, very unpleasant to the smell, but used in lamps by the poorer sort. There are also springs of black naphtha, which is thick, and in distillation grows not clear, but yellow; but the most valuable is the white naphtha, which is naturally clear and yellowish, and bears a great price. The Russians drink it as a cordial, but it does not intoxicate: it is used externally in paralytic disorders, and is carried into India as a great rarity, where they make with it the most beautiful and lasting Japan that has ever yet been known.

What the Indians call the Everlasting Fire, lies about ten English miles north-east-by-east from the city of Baku, on dry rocky ground. There are several ancient temples, built with stone, supposed to have been all dedicated to Fire: most of them are low arched vaults, from ten to fifteen feet high. Amongst the rest, there is a temple in which the Indians now worship; near the altar, about three feet high, there is a large hollow cave, from the end of which issues a flame, in colour and gentleness, not unlike a lamp that burns with spirits. The Indians affirm that this flame has continued burning some thousands of years, and believe it will last to the end of the world; and that if it was resisted or suppressed in this place, it would rise in some other. By the number of temples, it is probable there were formerly a great number of worshippers of fire, as well Indians as Persians: they are called Gouers. At present there are about twenty persons, who reside there constantly, and go almost naked. In summer it is very hot; and in winter they dwell within doors, and keep what fire they please, in the manner above described: they live upon roots and herbs for the most part, and are supposed to attend as mediators for the sins of many who are absent; and by their applications to this fire, in which the Deity is supposed to be present and visible, they atone for the sins of others. A little way from the temple just now mentioned, near Baku, is a low cliff of a rock, in which there is a horizontal gap, two feet from the ground, between five and six long, and about three feet broad, out of which issues a constant flame, much of the colour mentioned already, being a light blue. It rises sometimes eight feet high, but is lower in still weather. They do not perceive the rock waste in the least. This also the Indians worship, and say it cannot be put out. About twenty yards on the back of this cliff is a well, and a rock twelve or fourteen fathoms deep, with exceedingly good water.

We shall next introduce an account of a BURNING SPRING IN KENTUCKY.—This is a phenomenon which has for several years excited the attention of travellers, under the name of a burning spring: it exists in one of the principal forks of Lick-

ing river in Kentucky. It is situated about three-fourths of a mile from the banks of the river, and about eighty miles above its junction with Ohio, opposite Cincinnati. A spring here breaks out at the foot of a hill, forming a basin of water about six feet in diameter and two feet deep, at the bottom of which issues a stream of gas, which in volume and force is about equal to the blast forced from a common smith's bellows; but there is no cessation of its force, which is such as to create a violent ebullition in the water. Being heavier than common atmospheric air, the gas, on passing up through the water, constantly occupies the surface, which is still the lower part of an indenture in the earth at that place. On presenting a taper, this gas instantly takes fire, and burns with great brilliancy. There is no absorption of it by the water, which possesses the purity of common spring water, neither is any offensive odour thrown off. This spring has been known to dry up entirely in the summer, when the air rushes out with increased force, accompanied by a hissing noise. There is nothing like smoke emitted.—*Schoolcroft, on the Lead Mines of Missouri*, p. 216.

HOT SPRINGS OF ICELAND.—From Sir G. Mackenzie's Travels in Iceland.

"The hot springs in the valley of Reikholt, or Reikiadal, though not the most magnificent, are not the least curious among the numerous phenomena of this sort that are found in Iceland. On entering the valley, we saw numerous columns of vapour ascending from different parts of it. The first springs we visited, issued from a number of apertures in a sort of platform of rock, covered by a thin coating of calcareous incrustations. From several of the apertures the water rose with great force, and was thrown two or three feet into the air. On plunging the thermometer into such of them as we could approach with safety, we found that it stood at 212°.

"A little further up the valley, there is a rock in the middle of the river, about ten feet high, twelve yards long, and six or eight feet in breadth: from the highest part of this rock a jet of boiling water proceeded with violence; dashing the water up to the height of several feet. Near the middle, and not more than two feet from the edge of the rock, there is a hole, about two feet in diameter, full of water boiling strongly. There is a third hole near the other end of the rock, in which water also boils briskly. At the time we saw these springs, there happened to be less water in the river than usual, and a bank of gravel was left dry a little higher up than the rock. From this bank a considerable quantity of boiling water issued.

“About a mile further down, at the foot of the valley, is the Tungahver, an assemblage of springs the most extraordinary, perhaps, in the whole world. A rock (*waoke?*) rises from the bog, about twenty feet, and is about fifty yards in length, the breadth not being considerable. This seems formerly to have been a hillock, one side of which remains covered with grass, while the other has been worn away, or perhaps destroyed at the time when the hot water burst forth. Along the face of the rock are arranged no fewer than sixteen springs, all of them boiling furiously, and some of them throwing the water to a considerable height. One of them, however, deserves particular notice. On approaching this place, we observed a high jet of water near one extremity of the rock. Suddenly this jet disappeared, and another, thicker but not so high, rose within a very short distance of it. At first we supposed that a piece of the rock had given way, and that the water had at that moment found a more convenient passage. Having left our horses, we went directly to the place where this had apparently happened; but we had scarcely reached the spot, when this new jet disappeared, and the one we had seen before was renewed. We observed that there were two irregular holes in the rock, within a yard of each other; and while from one a jet proceeded to the height of twelve or fourteen feet, the other was full of boiling water. We had scarcely made this observation, when the first jet began to subside, and the water in the other hole to rise; and as soon as the first had entirely sunk down, the other attained its greatest height, which was about five feet. In this extraordinary manner, these two jets played alternately. The smallest and highest jet continued about four minutes and a half, and the other about three minutes. We remained admiring this very remarkable phenomenon for a considerable time, during which we saw many alternations of the jets, which happened regularly at the intervals already mentioned.

“I have taken the liberty to give a name to this spring, and to call it ‘The Alternating Geyser.’

“These springs have been formerly observed, though the singularity of the alternations does not seem to have been attended to as any thing remarkable. Olafson and Paulson mention, that the jets appear and disappear successively, in the second, third, and fourth openings. We observed no cessations in any of the springs, except in the two under consideration.

“To form a theory of this regular alternation is no easy matter; and it seems to require a kind of mechanism very different from the simple apparatus usually employed by nature in ordinary intermittent or spouting springs. The prime mover in this case is evidently steam, an agent sufficiently

powerful for the phenomena. The two orifices are manifestly connected; for, as the one jet sinks towards the surface, the other rises, and this in a regular and uniform manner. I observed once, that when one of the jets was sinking, and the other beginning to rise, the first rose again a little before it was quite sunk down, and then when this happened, the other ceased to make any efforts to rise, and returned to its former state, till the first again sunk, when the second rose and played as usual. This communication must be formed in such a manner, that it is never complete, but alternately interrupted, first on one side, and then on the other. To effect this without the intervention of valves, seems to be impossible; and yet it is difficult to conceive the natural formation of a set of permanent valves: so that this fountain becomes one of the greatest curiosities ever presented by nature, even though, in attempting to explain the appearances it exhibits, we take every advantage that machinery can give us. If it is occasioned by natural valves, these must be of very durable materials, in order to withstand the continual agitation and consequent attrition."

We next proceed to a description of the HOT SPRINGS OF OUACHITTA, (WASHITAW.)—These springs, which have been known for many years, are situated on a stream called Hot Spring Creek, which falls into the Washitaw River, eight miles below. They lie fifty miles south of the Arkansa River, in Clark county, territory of Arkansa, (lately Missouri,) and six miles west of the road from Cadron to Mount Prairie, on Red River.

The approach to the springs lies up the valley of the creek. On the right of the valley rises the hot mountain, with the springs issuing at its foot; on the left, the cold mountain, which is little more than a confused and mighty pile of stones. The hot mountain is about 300 feet high, rising quite steep, and presenting occasionally ledges of rocks; it terminates above in a confused mass of broken rocks. The steep and otherwise sterile sides are covered with a luxuriant growth of vines. The valley between this and the cold mountain is about fifty yards wide.

The springs issue at the foot of the hot mountain, at an elevation of about ten feet above the level of the creek; they are very numerous all along the hill-side, and the water, which runs in copious streams, is quite hot; it will scald the hand, and boil an egg hard in ten minutes. Its temperature is considered that of boiling water, but Dr. Andrews, of Red River, thinks it is not above 200° Fahr. There is a solitary spring, situated seventy feet higher than the others on the side of the mountain, but it is of an equal temperature, and differs in no

respect from those below. A dense fog continually hangs over the springs and upon the side of the hill, which at a distance looks like a number of furnaces in blast. To this fog, condensed into water, is attributed the rank growth of the vines on the side of the mountain.

Very little is known of the chemical nature of the water; an analysis is said to have been made, which indicated a little carbonate of lime. An abundance of beautiful green moss grows at the edges of the springs, and the paths of their waters are marked by a brighter vegetation than occurs elsewhere. The substance of the rocks here, are, limestone, slate, and quartz.—*Schoolcraft, Lead Mines of Missouri*, p. 258.

We shall conclude this chapter with an account of **VARIOUS OTHER BURNING SPRINGS**.—There are many burning springs in different parts of the world, particularly one in France, in the department of Isere, near Grenoble; another near Hermanstadt, in Transylvania; a third at Chermay, a village near Switzerland; a fourth in the canton of Friburg; and a fifth not far from the city of Cracow, in Poland. There also is, or was, a famous spring of this kind at Wigan, in Lancashire, which, upon the approach of a lighted candle, would take fire and burn like spirit of wine for a whole day. But the most remarkable one in England, or at least that of which we have the minutest description, was discovered in 1711, at Brosely, in Shropshire. The following account of this remarkable spring was given by the Rev. Mr. Mason Woodwardin, Professor at Cambridge, dated Feb. 18th, 1746:—"The well, for four or five feet deep, is six or seven feet wide; within that, is another less hole of like depth, dug in the clay, in the bottom whereof is placed a cylindric earthen vessel, of about four or five inches diameter at the mouth, having the bottom taken off, and the sides well fixed in the clay, which is rammed close about it. Within the pot is a brown water, thick and puddly, continually forced up with a violent motion beyond that of boiling water, and a rumbling hollow noise, rising or falling by fits, five or six inches; but there was no appearance of any vapour rising, which perhaps might have been visible, had not the sun shone so bright. Upon putting a candle down at the end of a stick, at about a quarter of a yard distance, it took fire, darting and flashing after a very violent manner for about half a yard high, much in the manner of spirits in a lamp, but with great agitation. It was said, that a teakettle had been made to boil in nine minutes, and that it had been left burning for forty-eight hours without any sensible diminution. It was extinguished by putting a wet mop upon it; which must be kept there for a little time, otherwise it would not go out. Upon the removal of the mop, there arises a sul-

phureous smoke, lasting about a minute, and yet the water is very cold to the touch." In 1755, this well totally disappeared, by the sinking of a coal-pit in its neighbourhood. The cause of the inflammable property of such waters is with great probability supposed to be their mixture with petroleum, which is one of the most inflammable substances in nature, and has the property of burning on the surface of water.

CHAP. XLVIII.

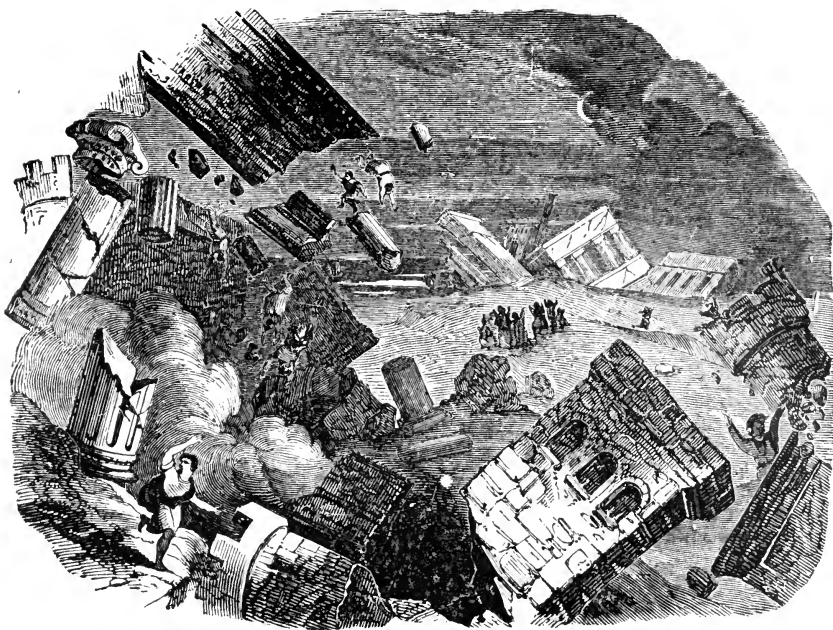
CURIOSITIES RESPECTING EARTHQUAKES.

Earthquakes, Nature's agonizing pangs,
 Oft shake the astonish'd isles; the Solfaterro
 Or sends forth thick, blue, suffocating steams,
 Or shoots to temporary flames. A din,
 Wild, thro' the mountain's quivering rocky caves,
 Like the dread crash of tumbling planets, roars.
 When tremble thus the pillars of the globe,
 Like the tall cocoa by the fierce north blown,
 Can the poor brittle tenements of man
 Withstand the dread convulsion? Their dear homes,
 Which shaking, tottering, crashing, bursting, fall,
 The boldest fly; and, on the open plain
 Appall'd in agony, the moment wait,
 When, with disruption vast, the waving earth
 Shall whelm them in her sea-disgorging womb.
 Nor less affrighted are the bestial kind;
 The bold steed quivers in each panting vein,
 And staggers, bath'd in deluges of sweat:
 The lowing herds forsake their grassy food,
 And send forth frightened, woful, hollow sounds:
 The dog, thy trusty centinel of night,
 Deserts the post assign'd, and piteous howls.
 Wide ocean feels—
 The mountain waves, passing their custom'd bounds,
 Make direful loud incursions on the land,
 All overwhelming: sudden they retreat,
 With their whole troubled waters; but anon
 Sudden return, with louder, mightier force;
 The black rocks whiten, the vex'd shores resound;
 And yet, more rapid, distant they retire.
 Vast corruscations lighten all the sky
 With volum'd flames, while thunder's awful voice,
 From forth his shrine by night and horror girt,
 Astounds the guilty, and appals the good

Grainger.

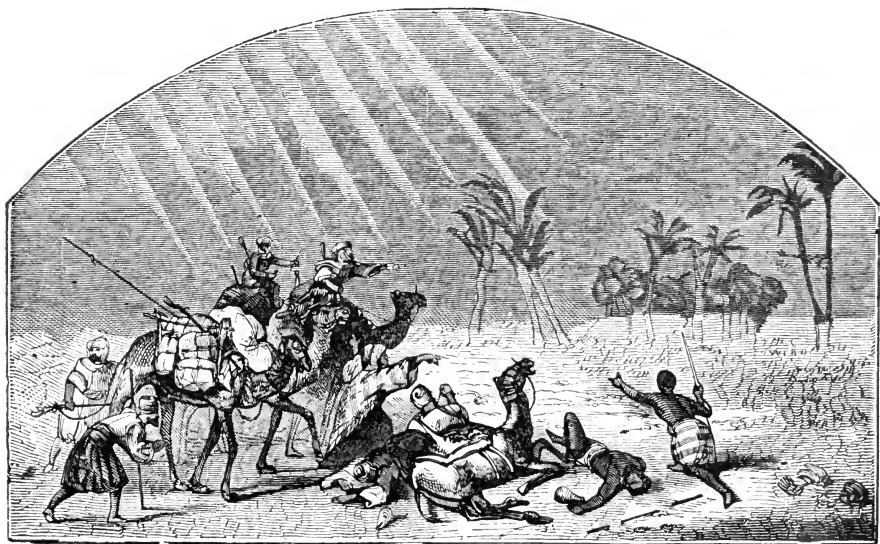
EARTHQUAKES AND THEIR CAUSES.—From A. de Humboldt's Personal Narrative of Travels, translated by Helen Maria Williams.

"It is a very old and commonly received opinion at Cumana, Acapulca, and Lima, that a perceptible connection exists



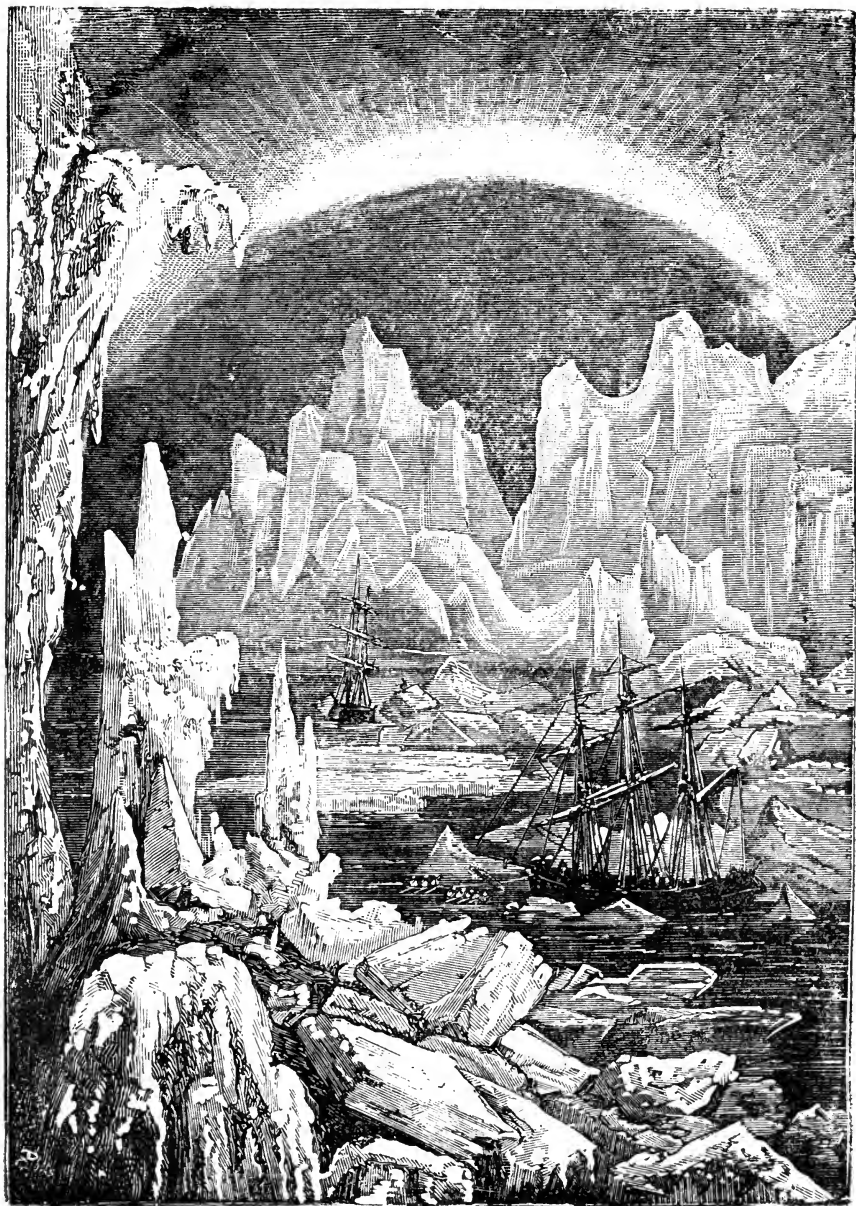
EFFECTS OF AN EARTHQUAKE.

The engraving represents the great earthquake of 1755, in which the city of Lisbon, in Portugal, was entirely destroyed, and 20,000 persons were killed.



SAND STORM OR SAND FLOOD IN THE DESERTS OF ARABIA.

In these terrible whirlwinds of sand, whole caravans are sometimes overwhelmed and destroyed



ARCTIC REGIONS.

between earthquakes, and the state of the atmosphere that precedes these phenomena. On the coast of New Andalusia, the inhabitants are alarmed, when, in excessively hot weather, and after long droughts, the breeze suddenly ceases to blow, and the sky, clear and without clouds at the zenith, exhibits near the horizon, at six or eight degrees elevation, the appearance of a reddish vapour. These prognostics are however very uncertain; and when the whole of the meteorological variations, at the times when the globe has been the most agitated, are called to mind, it is found, that violent shocks take place equally in dry and in wet weather, when the coolest winds blow, or during a dead and suffocating calm. From the great number of earthquakes, which I have witnessed to the north and south of the equator; on the continent, and in the basins of the seas; on the coasts, and at 2500 toises height; it appears to me, that the oscillations are generally very independent of the previous state of the atmosphere. This opinion is embraced by a number of enlightened persons, who inhabit the Spanish colonies; and whose experience extends, if not over a greater space of the globe, at least to a greater number of years than mine. On the contrary, in parts of Europe where earthquakes are rare compared to America, natural philosophers are inclined to admit an intimate connection between the undulations of the ground, and certain meteors, which usually take place at the same epocha. In Italy, for instance, the sirocco and earthquakes are suspected to have some connection; and at London, the frequency of falling stars, and those southern lights which have since been often observed by Mr. Dalton, were considered as the forerunners of those shocks which were felt from 1748 to 1756.

“On the days when the earth is agitated by violent shocks, the regularity of the horary variations of the barometer is not disturbed under the tropics. I have verified this observation at Cumana, at Lima, and at Riobamba; and it is so much the more worthy of fixing the attention of natural philosophers, as in St. Domingo, at the town of Cape François, it is asserted that a water barometer was observed to sink two inches and a half immediately before the earthquake of 1770. It is also related, that at the time of the destruction of Oran, a druggist fled with his family, because, observing accidentally, a few minutes before the earthquake, the height of the mercury in his barometer, he perceived that the column sunk in an extraordinary manner. I know not whether we can give credit to this assertion: but as it is nearly impossible to examine the variations of the weight of the atmosphere during the shocks, we must be satisfied in observing the barometer before or after these phenomena have taken place. In the temperate zone, the aurora borealis does not always modify the variation

of the needle, and the intensity of the magnetic forces: perhaps also earthquakes do not act constantly in the same manner on the air that surrounds us.

"We can scarcely doubt, that the earth, when opened and agitated by shocks, occasionally sends forth gaseous exhalations through the atmosphere, in places remote from the mouths of volcanoes not extinct. At Cumana, as we have already observed, flames and vapours, mixed with sulphureous acid, spring up from the most arid soil. In other parts of the same province, the earth ejects water and petroleum. At Riobamba, a muddy and inflammable mass, which is called *moya*, issues from crevices that close again, and accumulates into elevated hills. At seven leagues from Lisbon, near Colares, during the terrible earthquake of the 1st of November, 1755, flames, and a column of thick smoke, were seen to issue from the flanks of the rocks of Alvidras, and, according to some witnesses, from the bosom of the sea. This smoke lasted several days, and it was the more abundant in proportion as the subterraneous noise, which accompanied the shocks, was louder.

"Elastic fluids thrown into the atmosphere may act locally on the barometer, not by their mass, which is very small compared to the mass of the atmosphere; but because, at the moment of the great explosions, an ascending current is probably formed, which diminishes the pressure of the air. I am inclined to think, that in the greater number of earthquakes, nothing escapes from the agitated earth, and that, when gaseous exhalations and vapours take place, they oftener accompany or follow, than precede, the shocks. This last circumstance explains a fact, which seems indubitable; I mean that mysterious influence, in equinoctial America, of earthquakes accompanying a change of climate, and the order of the dry and rainy seasons. If the earth generally acts on the air only at the moment of the shocks, we can conceive why it is so rare that a sensible meteorological change becomes the presage of these great revolutions of nature.

"The hypothesis, according to which, in the earthquakes of Cumana, elastic fluids escape from the surface of the soil, seems confirmed by the observation of the dreadful noise which is heard during the shocks at the borders of the wells in the plain of Charas. Water and sand are sometimes thrown out twenty feet high. Similar phenomena have not escaped the observation of the ancient inhabitants of Greece and Asia Minor, abounding with caverns, crevices, and subterraneous rivers. Nature, in its uniform progress, every where suggests the same ideas of the causes of earthquakes, and the means by which man, forgetting the measure of his strength, pretends to diminish the effect of the subterraneous explosion."

What a great Roman naturalist has said of the utility of wells and caverns, is repeated in the New World by the most ignorant Indians of Quito, when they shew travellers the guaicos, or crevices of Pichincha.

"The subterraneous noise, so frequent during earthquakes, is generally not in the ratio of the strength of the shocks. At Cumana it constantly precedes them; while at Quito, and lately at Caraccas, and in the West India Islands, a noise like the discharge of a battery was heard a long time after the shocks had ceased. A third kind of phenomenon, the most remarkable of the whole, is the rolling of those subterraneous thunders, which last several months, without being accompanied by the least oscillating motion of the ground.

"In every country subject to earthquakes, the point where (probably by a disposition of the stony strata) the effects are the most sensible, is considered as the cause and the focus of the shocks. Thus, at Cumana, the hill of the castle of St. Antonio, and particularly the eminence on which the convent of St. Francis is placed, are believed to contain an enormous quantity of sulphur, and other inflammable matter. We forget, that the rapidity with which the undulations are propagated to great distances, even across the basin of the ocean, proves that the centre of action is very remote from the surface of the globe. From this same cause, no doubt, earthquakes are not restrained to certain species of rocks, as some naturalists pretend, but all are fitted to propagate the movement. In order to keep within the limits of my own experience, I shall here cite the granites of Lima and Acapulco; the gneiss of Caraccas; the mica-slate of the peninsula of Araya; the primitive thonschiefer of Tepecuacuilco, in Mexico; the secondary limestones of the Apennines; Spain, and new Andalusia; and finally, the trappean porphyries of Quito and Popayan. In these different places the ground is frequently agitated by the most violent shocks; but sometimes, in the same rock, the superior strata form invincible obstacles to the propagation of the motion. Thus, in the mines of Saxony, we have seen workmen hasten up, affrighted by oscillations which were not felt at the surface of the ground.

"If, in regions the most remote from each other, primitive, secondary, and volcanic rock, share equally in the convulsive movements of the globe; we cannot but admire also, that in ground of little extent, certain classes of rocks oppose themselves to the propagation of the shocks. At Cumana, for instance, before the catastrophe of 1797, the earthquakes were felt only along the southern and calcareous coast of the gulf of Cariaco, as far as the town of this name; while in the peninsula of Araya, and at the village of Marinaquez, the ground did not partake of the same agitation. The inhabitants of

this northern coast, which is composed of mica-slate, built their huts on a motionless earth; a gulf three or four thousand fathoms in breadth separated them from a plain covered with ruins, and overturned by earthquakes. This security, founded on the experience of several ages, has vanished; and since the fourteenth of December, 1797, new communications appear to have been opened in the interior of the globe. At present the peninsula of Araya is not merely subject to the agitation of the soil of Cumana; the promontory of mica-slate is become in its turn a particular centre of the movements. The earth is sometimes strongly shaken at the village of Marinaquez, when on the coast of Cumana the inhabitants enjoy the most perfect tranquillity. The gulf of Cariaco nevertheless is only sixty or eighty fathoms deep.

“It is thought, from observations made both on the continent and in the islands, that the western and southern coasts are most exposed to shocks. This observation is connected with the ideas which geologists have long formed of the position of the high chains of mountains, and the direction of their steepest declivities: the volcanic phenomena of the Cordilleras and Caraccas, and the frequency of the oscillations on the eastern and northern coast of Terra Firma, in the gulf of Paria, at Carupano, at Cariaco, and at Cumana, are proofs of the certainty of this opinion. In New Andalusia, as well as in Chili and Peru, the shocks follow the course of the shore, and extend but little inland. This circumstance, as we shall soon find, indicates an intimate connection between the causes that produce earthquakes and volcanic eruptions. If the earth was most agitated on the coasts, because they are the lowest part of the land, why should not the oscillations be equally strong and frequent on those vast savannas or meadows, which are scarcely eight or ten toises above the level of the ocean?

“The earthquakes of Cumana are connected with those of the West India Islands; and it has even been suspected, that they have some connection with the volcanic phenomena of the Cordilleras of the Andes. On the fourth of November, 1797, the soil of the province of Quito underwent such a destructive commotion, that, notwithstanding the extreme thinness of the population of that country, near forty thousand natives perished, buried under the ruins of their houses, swallowed up in the crevices, or drowned in lakes that were suddenly formed. At the same period, the inhabitants of the eastern Antilles were alarmed by shocks; which continued during eight months, when the volcano of Guadaloupe threw out pumice stones, ashes, and gusts of sulphureous vapours. This eruption of the twenty-seventh of September, during which very long-continued subterraneous noises were heard, was

followed on the fourteenth of December by the great earthquake of Cumana. Another volcano of the West India Islands, that of St. Vincent's, has lately given a fresh instance of these extraordinary connections. This volcano had not emitted flames since 1718, when they burst forth anew, in 1812. The total ruin of the city of Caraccas preceded this explosion thirty-five days, and violent oscillations of the ground were felt, both in the islands, and on the coasts of Terra Firma.

"It has long been remarked, that the effects of great earthquakes extend much farther than the phenomena arising from burning volcanoes. In studying the physical revolutions of Italy, and carefully examining the series of the eruptions of Vesuvius and Etna, we can scarcely recognize, notwithstanding the proximity of these mountains, any traces of simultaneous action. It is, on the contrary, undeniable, that at the period of the last and preceding destruction of Lisbon, the sea was violently agitated even as far as the New World, for instance, at the island of Barbadoes, more than twelve hundred leagues distant from the coasts of Portugal.

"Several facts tend to prove, that the causes which produce earthquakes have a near connection with those that act in volcanic eruptions. We learnt at Pasto, that the column of black and thick smoke, which in 1797 issued for several months from the volcano near this shore, disappeared at the very hour when, sixty leagues to the south, the towns of Riobamba, Hambato, and Tacunga, were overturned by an enormous shock. When, in the interior of a burning crater, we are seated near those hillocks formed by ejections of scoria and ashes, we feel the motion of the ground several seconds before each partial eruption takes place. We observed this phenomenon at Vesuvius in 1805, while the mountain threw out scoria; we were witnesses of it in 1812, on the brink of the immense crater of Pichincha, from which nevertheless at that time clouds of sulphureous acid vapours only issued.

"Every thing in earthquakes seems to indicate the action of elastic fluids seeking an outlet to spread themselves in the atmosphere. Often, on the coasts of the South Sea, the action is almost instantaneously communicated from Chili to the gulf of Guayaquil, a distance of six hundred leagues; and, what is very remarkable, the shocks appear to be so much the stronger, as the country is more distant from burning volcanoes. The granitic mountains of Calabria, covered with very recent breccia, the calcareous chain of the Apennines, the country of Pignerol, the coasts of Portugal and Greece, and those of Peru and Terra Firma, afford striking proofs of this assertion. The globe, it may be said, is agitated with greater

force, in proportion as the surface has a smaller number of funnels communicating with the caverns of the interior. At Naples and Messina, at the foot of Cotopaxi and of Tunguragua, earthquakes are dreaded only when vapours and flames do not issue from the crater. In the kingdom of Quito, the great catastrophe of Riobamba, which we have before mentioned, has led several well-informed persons to think, that this unfortunate country would be less often desolate, if the subterraneous fire would break the porphyritic dome of Chimborazo; and this colossal mountain should become a burning volcano. At all times analogous facts have led to the same hypothesis. The Greeks, who, like ourselves, attributed the oscillations of the ground to the action of elastic fluids, cited, in favour of their opinion, the total cessation of the shocks at the island of Eubœa, by the opening of a crevice in the Ælantine plain."

The following is an account of an Earthquake of Caraccas; by M. Palacio Faxar:—

"The ridge of mountains, which branches out from the Andes near the isthmus of Panama, and which, taking the direction of the eastern coast, crosses part of New Granada and Venezuela, seems to have been the seat of that earthquake, which, on the 26th March, 1812, destroyed many populous towns of the province of Caraccas. It is this branch of the Cordilleras, that forms the Sierra-nevada of Chita, that of Merida de Maracaybo, and the height called La Silla de Caracca; and it is between these three remarkable points that the gold mines of Pamplona, the mineral water of Merida de Maracaybo, and the copper mines of Aroa, are found. Between the picturesque Sierra-nevada of Merida de Maracaybo, and La Silla de Caracca, where spring is perpetual, the earthquake was most strongly felt.

"At the south-east of this ridge of mountains, there are plains of an immense extent, covered with different species of grasses, and watered by innumerable torrents, which falling from the mountains, and uniting in different bodies, majestically enter the Orinoco. These plains were likewise convulsed for above 120 leagues in Venezuela: the towns situate immediately at the foot of the Cordillera, or in the valleys between them, suffered most severely: those seated in the plains did not suffer considerable injury, though violently shaken. For five months a continued drought had parched the earth, no rain having fallen, and in the preceding month of December, a slight shock of an earthquake had been felt at Caraccas. It was on the eve of the Crucifixion, when Catholics assembled together in their churches, to commemorate, with public prayers and processions, the sufferings and merits

of their Redeemer, that this sad catastrophe had happened. The weather was fine, and the air serene, when between four and five P. M. a hollow sound like the roar of a cannon was heard, which was followed by a violent oscillatory motion from west to east, which lasted about seventeen seconds, and which stopped all the public clocks; the convulsion diminished for some moments, but was succeeded by a more violent shock than the first, for nearly twenty seconds, keeping the same direction; a calm followed, which lasted about fourteen seconds, after which, a most alarming trepidation of the earth took place for fifteen seconds; the total duration about one minute and fifteen seconds. The inhabitants of Caraccas, struck with terror, unitedly and loudly implored the protection of Heaven: some ran wildly through the streets; some remained immovable with astonishment; while others, crowding into the churches, sought refuge at the foot of the altar. The crash of falling buildings, the clouds of dust which filled the air, and the anxious cries of mothers, who inquired in vain for their children lost in the tumult, increased the horrors of this sad day. To this scene of disorder succeeded the most horrible despair. Dead bodies, wounded persons crying for protection, presented themselves every where to those who had escaped from the catastrophe, and who could not turn their eyes from these objects of pity and horror, without meeting with heaps of ruin, which had buried hundreds of unfortunate persons, whose lamentations uselessly pierced their hearts, for it was impossible to give relief or assistance to all.

“ It has been computed, that in this calamitous day, near 20,000 persons perished at Venezuela. A great part of the veteran troops were of this number; and all the arms destined for the defence of their country, were buried under the ruins of the barracks. The towns of Caraccas, Merida de Maracaybo, and Laguaira, were totally destroyed; those of Barquirineto, Sanfelipe, and others, suffered considerably. It is to be remarked, that Truxillo, which is situate between Merida de Maracaybo and Sanfelipe, experienced very little damage. At the last place, near the mines of Aroa, the first signal they had of the earthquake was an electric shock, which deprived many persons of their power of motion; and in Valencia, Caraccas, and the neighbouring country, the inhabitants were, for about twenty days after the earthquake, in an extraordinary state of irritability. Many persons, who suffered from intermittent fevers, recovered immediately, in consequence of the effect of the earthquake.

“ At Vallecillo, near Valencia, a rivulet spouted out from a hill, which continued to flow for some hours after the earthquake, and which I visited a few days after. The river Guaire, which runs through the valley of Caraccas, was greatly swelled

soon after the earthquake, and remained in that state for several days. The water of the bay of Maracaybo withdrew considerably, and it is said that the mountain Avila, which separates Caraccas from Laguaira, sunk several feet into the earth.

"The earthquakes continued for many days, we may say, without interruption: they diminished as it were by degrees, though the last were remarkably strong. So late as the month of October in the same year, there was a violent shock. The earthquake of the 26th March was felt at Santafé de Bogotá, and even at Carthagera, though it was very little felt at Cumana.

"In the following April, a volcano burst out in the island of St. Vincent. About the time of the eruption, a noise like that occasioned by the discharge of a cannon was heard at Caraccas and Laguaira, which caused a general alarm, the inhabitants of each place supposing that the neighbouring town was attacked by the enemy. This roaring noise was distinctly heard where the river Nula falls into the Apure, which is more than 100 leagues from Caraccas. In the same year, 1812, many strong shocks of an earthquake were felt at Samaica and Curaçoa.

"The earthquake of the 26th March alarmed so deeply the inhabitants of Venezuela, that they expected to see the earth open and swallow them at every convulsion; and as it happened on the anniversary of their political revolution, they supposed that event had incurred the displeasure of the Almighty. The clergy, who were enemies to the revolution, as their privileges had been diminished by the new constitution of Venezuela, availed themselves of the disposition of the people, and preached every where against the new republic. Such was the beginning of the civil war at Venezuela; a war, which has desolated those beautiful countries, and which has destroyed the tenth part of their population."

The celebrated poet Cowper, in the second book of his admirable poem, *The Task*, has given us a very accurate and sublime description of the effects of Earthquakes, from which the following is an extract:—

The rocks fall headlong, and the valleys rise,
The rivers die into offensive pools,
And, charg'd with putrid verdure, breathe a gross
And mortal nuisance into all the air.
What solid was, by transformation strange,
Grows fluid; and the fixt and rooted earth,
Tormented into billows, heaves and swells,
Or with vortiginous and hideous whirl
Sucks down its prey insatiable. Immense
The tumult and the overthrow, the pangs
And agonies of human and of brute

Multitudes, fugitive on ev'ry side,
 And fugitive in vain. The sylvan scene
 Migrates uplifted; and, with all its soil,
 Alighting on far distant fields, finds out
 A new possessor, and survives the change.
 Ocean has caught the frenzy, and, upwrought
 To an enormous and o'erbearing height,
 Not by a mighty wind, but by that voice
 Which winds and waves obey, invades the shore
 Resistless. Never such a sudden flood,
 Upridg'd so high, and sent on such a charge,
 Possess'd an inland scene. Where now the throng
 That press'd the beach, and, hasty to depart,
 Look'd to the sea for safety? They are gone,
 Gone with the reflux wave into the deep—
 A prince with half his people."

It is a consolation to every good man, to consider that the world is governed by a wise and good, as well as powerful BEING, who gives liberty to the powers of nature to range, or restrains them, as may best suit his divine purposes; which have always the ultimate good of the whole creation in view.

CHAP.

CURIOSITIES RESPECTING WINDS, HURRICANES, &c.

Remarkable Winds in Egypt—Whirlwinds of Egypt—Tornado—Harmattan—Hurricane—Monsoons—Velocity of the Wind.

Bound as they are, and circumscrib'd in place,
 They rend the world, resistless where they pass,
 And mighty marks of mischief leave behind;
 Such is the rage of their tempestuous kind.
 First, Eurus, to the rising morn is sent,
 The regions of the balmy continent,
 And eastern realms, where early Persians run
 To greet the blest appearance of the sun.
 Westward the wanton Zephyr wings his flight,
 Pleas'd with the remnant of departing light:
 Fierce Boreas, with his offspring, issues forth
 T' invade the frozen waggon of the north;
 While frowning Auster seeks the southern sphere. *Ovid.*

REMARKABLE WINDS IN EGYPT.

EGYPT is infested with the destructive blasts common to all warm countries which have deserts in their neighbourhood. These have been distinguished by various names, such as Poisonous winds, Hot winds of the desert, Samiel, the wind of Damascus, Camseen, and Simoom. In Egypt they are denominated "Winds of fifty days," because they most commonly

prevail during the fifty days preceding and following the equinox, though, should they blow constantly during one half of that time, an universal destruction would be the consequence. Of these, travellers have given various descriptions. M. Volney says, that the violence of their heat may be compared to that of a large oven at the moment of drawing out the bread. They always blow from the south, and are undoubtedly owing to the motion of the atmosphere over such vast tracts of hot sand, which cannot be supplied with a sufficient quantity of moisture. When they begin to blow, the sky loses its usual serenity, and assumes a dark, heavy, and alarming aspect, the sun laying aside his usual splendour, and becoming of a violet colour. This terrific appearance seems not to be occasioned by any real haze or cloud in the atmosphere at that time, but solely by the vast quantity of fine sand carried along by those winds, and which is so excessively subtle that it penetrates every where. The motion of this wind is always rapid, but its heat is not intolerable till it has continued for some time. Its pernicious qualities are evidently occasioned by its excessive aridity; for it dries and shrivels up the skin, and, by affecting the lungs in a similar manner, soon produces suffocation and death. The danger is greatest to those of a plethoric habit, or who have been exhausted by fatigue; and putrefaction very soon takes place in the bodies of such as are destroyed by it. Its extreme dryness is such, that water sprinkled on the floor evaporates in a few minutes; all the plants are withered and stripped of their leaves, and a fever is instantly produced in the human species by the suppression of perspiration. It usually lasts three days, but is altogether insupportable if it continue beyond that time.

The danger is greatest when the wind blows in squalls, and to travellers who happen to be exposed to its fury without any shelter. The best method, in this case, is to stop the nose and mouth with a handkerchief: camels, by a natural instinct, bury their noses in the sand, and keep them there till the squall is over. The inhabitants, who have an opportunity of retiring to their houses, instantly shut themselves up in them, or go into pits made in the earth, till the destructive blast is over.

The description of a blast of this kind, which overtook Mr. Bruce, in the desert of Nubia, is still more terrible.—The sun was now obscured by them,* and the transmission of his rays gave them a dreadful appearance, resembling pillars of fire. This was pronounced by the guide to be a sign of the approaching simoom, or hot wind; and he directed, that when it came, the people should fall upon their faces, and keep their

The moving columns of sand.

mouths on the sand, to avoid drawing in this pernicious blast with their breath. On his calling out that the simoon was coming, Mr. Bruce turned for a moment to the quarter from whence it came, which was the south-east. It appeared like a haze or fog of a purple colour, but less bright than the purple part of the rainbow; seemingly about twenty yards in breadth, and about twelve feet high from the ground. It moved with such rapidity, that before he could turn about and fall down, he felt the vehement heat of its current upon his face; and even after it passed over, which was very quickly, the air which followed was of such a heat as to threaten suffocation. Mr. Bruce had unfortunately inspired some part of the pernicious blast; by which means he almost entirely lost his voice, and became subject to an asthmatic complaint, from which he did not get free for two years.

The same phenomenon occurred twice over on their journey through this desert. The second time it came from the south a little to the east, but it seemed to have a shade of blue along with the purple, and its edges were less perfectly defined, resembling rather a thin smoke, and having about a yard in the middle tinged with blue and purple.

The third time, it was preceded by an appearance of sandy pillars, more magnificent than any they had yet observed; the sun shining through them in such a manner as to give those which were nearest a resemblance of being spangled with stars of gold. The simoom which followed had the same blue and purple appearance as before, and was followed by a most suffocating wind for two hours, which reduced our travellers to the lowest degree of weakness and despondency.

It was remarkable, that this wind always came from the south-east, while the sandy pillars, which prognosticated its approach, seemed to keep to the westward, and to occupy the vast circular space inclosed by the Nile to the west of their route, going round by Chaigie towards Dongola. The heaps of sand left by them when they fell, or raised by the whirlwinds which carried them up, were twelve or thirteen feet high, exactly conical, tapering to a fine point, and their bases well proportioned.

The following account of the WHIRLWINDS OF EGYPT, is from Belzoni's Narrative:—"A strong wind which arose this day leads me to mention some particulars of the phenomena that often happen in Egypt. The first I shall notice is the whirlwinds, which occur all the year round, but especially at the time of the *camseen* wind, which begins in April, and lasts fifty days. Hence the name of *camseen*, which in Arabic signifies fifty. It generally blows from the south-west, and lasts four, five, or six days without varying, so very strong that it

raises the sands to a great height, forming a general cloud, so thick that it is impossible to keep the eyes open, if not under cover. It is troublesome, even to the Arabs; it forces the sand into the houses through every cranny, and fills every thing with it. The caravans cannot proceed in the deserts; the boats cannot continue their voyages; and travellers are obliged to eat sand, in spite of their teeth. The whole is like a chaos. Often a quantity of sand and small stones gradually ascends to a great height, and forms a column of sixty or seventy feet in diameter, and so thick, that were it steady on one spot, it would appear a solid mass. This not only revolves within its own circumference, but runs in a circular direction over a great space of ground, sometimes maintaining itself in motion for half an hour, and wherever it falls it accumulates a small hill of sand. God help the poor traveller who is caught under it!"

We shall now describe a **TORNADO**.—This is a sudden and vehement gust of wind from all points of the compass, and frequent on the coast of Guinea. A tornado seems to partake much of the nature of a whirlwind, or perhaps of a water-spout, but is more violent in its effects. It commences very suddenly: several clouds being previously drawn together, a spout of wind, proceeding from them, strikes the ground, in a round spot of a few rods or perches in diameter, and proceeds thus half a mile or a mile. The proneness of its descent makes it rebound from the earth, throwing such things as are moveable before it, sideways, or in a lateral direction from it. A vapour, mist, or rain, descends with it, by which the path of it is marked with wet.

The following is a description of one which happened a few years since at Leicester, about fifty miles from Boston, in New England: it happened in July, on a hot day, about four o'clock in the afternoon. A few clouds having gathered westward, and coming over-head, a sudden motion of their running together in a point, being observed, immediately a spout of wind struck the west end of a house, and instantly carried it away, with a negro man in it, who was afterwards found dead in its path. Two men and a woman, by the breach of the floor, fell into the cellar; and one man was driven forcibly up into the chimney corner. These were preserved, though much bruised; they were wet with a vapour or mist, as were the remains of the floor, and the whole path of the spout. This wind raised boards, timbers, &c. A joist was found on one end, driven nearly three feet into the ground. The spout probably took it in its elevated state, and drove it forcibly down. The tornado moved with the celerity of a moderate wind, and declined in strength till it entirely ceased.

HARMATTAN.—This is a name given to a singular wind, which blows periodically from the interior parts of Africa, towards the Atlantic ocean. It prevails in December, January, and February, and is generally accompanied by a fog or haze, that conceals the sun for whole days together. Extreme dryness is the characteristic of this wind: no dew falls during its continuance, which is sometimes for a fortnight or more. The whole vegetable creation is withered, and the grass becomes at once like hay. The natives take the opportunity which this wind gives them, of clearing the land, by setting fire to trees and plants in this their exhausted state. The dryness is so extreme, that household furniture is damaged, and the wainscot of the rooms flies to pieces. The human body is also affected by it, so as to cause the skin to peel off; but in other respects it is deemed salutary to the constitution, by stopping the progress of infection, and curing almost all cutaneous diseases.

We now proceed to some curious particulars, under the term **HURRICANE.**—This is indeed a general name for any violent storm of wind, but is peculiarly applied to those storms which happen in the warmer climates, and which greatly exceed the most violent ones known in this country. Dr. Mosely, in his Treatise on Tropical Diseases, observes, that the ruin and desolation accompanying a hurricane can scarcely be described. Like fire, its resistless force consumes every thing in its track, in the most terrible and rapid manner. It is generally preceded by an awful stillness of the elements, and a closeness and mistiness in the atmosphere, which makes the sun appear red, and the stars larger. But a dreadful reverse succeeds: the sky is suddenly overcast and wild; the sea rises at once from a profound calm into mountains; the wind rages and roars like the noise of cannon; the rain descends in a deluge; a dismal obscurity envelops the earth with darkness; and the superior regions appear rent with lightning and thunder. The earth on these occasions often does, and always seems to tremble; whilst terror and consternation distract all nature: birds are carried from the woods into the ocean; and those whose element is the sea, seek for refuge on land; the frightened animals in the field assemble together, and are almost suffocated by the impetuosity of the wind in searching for shelter, which, when found, is but the prelude to destruction. The roofs of houses are carried to vast distances from their walls, which are beat to the ground, burying their inhabitants under them. Large trees are torn up by the roots, and huge branches shivered off, and driven through the air in every direction with immense velocity. Every tree and shrub that withstands the shock is stripped

of its loughs and foliage; plants and grass are laid flat on the earth; and luxuriant spring is changed in a moment to dreary winter. This direful tragedy ended, (when it happens in a town,) the devastation is surveyed with accumulated horror: the harbour is covered with wrecks of boats and vessels; and the shore has not a vestige of its former state remaining. Mounds of rubbish and rafters in one place; heaps of earth and trunks of trees in another; deep gullies from torrents of water; and the dead and dying bodies of men, women, and children, half buried, and scattered about, where streets stood but an hour before,—present the miserable survivors with the shocking conclusion of a spectacle, to be followed by famine, and, when accompanied by an earthquake, by mortal diseases.

Philosophers are now inclined to attribute these terrible phenomena to electricity, though the manner in which it acts in this case is by no means known. It seems probable, indeed, that not only hurricanes, but even the most gentle gales of wind, are produced by the action of the electric fluid.

In the next place we shall treat of **MONSOONS, or TRADE-WINDS.**

“Trade-winds, observing well their stated course,
To human good employ their pow’ful force;
The loaded ships across the ocean fann’d
By steady gales, spread commerce through the land:
These you observe—but have you no desire
The hidden spring of such effects t’inquire?
Or, when contending winds around you blow,
Do you ne’er wish the cause of them to know?”

Monsoons are those winds which blow six months constantly the same way, and the contrary way the other six months.

Mr. Olinthus Gregory observes, that “though the winds in a temperate zone of the earth are very inconstant and changeable, yet this is not the case in every part of the terrestrial globe; for, in the torrid zone, and some other parts, the winds are generally very uniform and constant in their direction, as will appear from the following facts relative thereto:—

“1. Over the Atlantic, and Pacific oceans, particularly between thirty degrees of north and thirty degrees of south latitude, the trade-winds, as they are called, blow uniformly from east to west, all the year round, with a small variation in the different seasons.

“2. When the sun is on the equator, the trade-winds, in sailing northward, veer more and more from the east towards the north; so that about their limit they become nearly north-

east; and *vice versa* in sailing southward, they become at last nearly south-east. 3. When the sun is near the tropic of Cancer, the trade-winds north of the equator become more nearly east than at other times, and those south of the equator more nearly south; and *vice versa*, when the sun is near the tropic of Capricorn. 4. The trade-winds are not due east upon the equator, but about four degrees to the north of it.

"To account for these facts relative to the winds, is a most curious and important, though mysterious, inquiry; having employed the pens of several very eminent philosophers: but amongst all the explanations I have seen, there is none in my opinion more agreeable to nature than one given by Mr. John Dalton, of Manchester, in his "Meteorological Observations and Essays." The method of reasoning applied to the subject in that work, I shall here make use of.

"The inequality of heat in the different climates and places, and the earth's rotation on its axis, appears to be the principal causes of all winds, regular and irregular. It may be observed, that whenever the heat is greatest, there the air will ascend, and a supply of colder air will be received from the neighbouring parts: it will be willingly allowed, that the heat is at all times greatest in the torrid zone, and decreases gradually in proceeding northward or southward; also that the poles may at all times be considered as the centres of cold. Hence it reasonably follows, that abstracting from accidental circumstances, there will be a constant ascent of air over the torrid zone, which air will afterwards fall northward and southward, whilst the colder air below is determined by a continual impulse towards the equator.

"When the effects of the earth's rotation are taken into consideration, our reasoning must be as follows: the air over any part of the earth's surface, when apparently at rest, or calm, will have the same rotatory velocity as that part; but if a quantity of air in the northern hemisphere receive an impulse in the direction of the meridian, either northward or southward, its rotatory velocity will be greater in the former case, and less in the latter, than that of the air into which it moves; consequently, if it move northward, it will have a greater velocity eastward than the air, or surface of the earth over which it moves, and will therefore become a south-west wind, or a wind between the south and west; and, *vice versa*, if it move southward, it becomes a north-east wind. From similar considerations it will appear, that in the southern hemisphere the winds will be north-west and south-east respectively.

"The trade-winds may therefore be explained thus. The two general masses of air proceeding from both hemispheres towards the equator, as they advance are constantly deflected

more and more towards the east, by reason of the earth's rotation; that from the southern hemisphere, originally a south wind, is made to veer more and more towards the east; in like manner, that from the northern hemisphere is made to change its directions from the north towards the east: these two masses meeting near the equator, their velocities south and north destroy each other, and they proceed afterwards with their common velocity from east to west round the torrid zone, excepting the irregularities produced by the continents. The equator is not in reality the place of concourse, but the northern parallel of four degrees; because the centre of heat is thereabouts, the sun being longer on the north side of the equator, than on the south side. Moreover, when the sun is near one of the tropics, the centre of heat upon the earth's surface is then nearer that tropic than usual, and therefore the winds about the tropic are more nearly east at that time, and those about the other tropic more nearly north and south.

“If all the terrestrial globe were covered with water, or if the variations of the earth's surface in heat were regular and constant, so that the heat was the same in every part of the same parallel of latitude, the winds would then be very nearly regular also: but this is not the case; for we find the irregularities of heat, arising from the interspersions of land and sea, are such, that though all the parts of the atmosphere in some measure conspire to produce regular winds about the torrid zone, yet very striking irregularities are often found to take place. A remarkable instance we have in monsoons, which are winds that in the Indian ocean, &c. blow for six months together one way, and the next six months the contrary way: these, with sea and land breezes, do not seem easily to be accounted for on any other principle than that of rarefaction.

“Perhaps some persons may be led to suppose, that the winds in the northern temperate zone should be between the north and east towards the poles, and between the south and west nearer the equator, almost as regular as the trade-winds: but when the change of seasons, the different capacities of land and water for heat, the interference and opposition of the two general currents, be considered, it might be concluded almost next to impossible that the winds in the temperate zone should exhibit any thing like regularity: however, notwithstanding this, observations sufficiently evince, that the winds therein are, for the most part, in the direction of one of the general currents; namely, somewhere between the south and west, or more commonly between the north and east; and that winds in other directions happen only as accidental varieties, chiefly in unsettled weather.

“We may have frequently taken notice, that several winds

particularly stormy ones, are attended with a cloudy sky; to this it may be added, that we have more winds than usually occur in rather less latitudes, where the atmosphere is generally more serene: these considered, make it exceedingly probable, that the aqueous vapours which are sustained by the air, from whence come clouds and rains, may be one great cause of irregular winds. It has been determined, from very accurate experiments, that one inch of water when evaporated will fill more than 2000 inches of space: hence it appears that the water which falls in drops of rain, &c. occupied more than 2000 times the space when it floated in the atmosphere in vapours; the condensation thereof must therefore occasion vacua of such a nature, as will cause winds of different kinds and degrees, according to the deficiency which is to be supplied.

“The economy of winds, an illustration of which has been here attempted, is admirably adapted to the various purposes of nature, and to the general intercourse of mankind:—if the earth had been fixed, and the sun had revolved about it, the air over the torrid zone, and particularly about the equator, would have been almost always stagnant; and in the other zones the winds would have had little variation either in direction or strength; in this case navigation would have been greatly impeded, and a communication between the two hemispheres by sea, rendered impracticable. On the present system of things, however, the irregularity of winds is of the happiest consequence, by being subservient to navigation: and a general circulation of air constantly takes place between the eastern and western hemispheres, as well as between the polar and equatorial regions; by reason of which, that diffusion and intermixture of the different aerial fluids, so necessary for the life, health, and prosperity of the animal and vegetable kingdoms, is accomplished:—such is the transcendent wisdom and providential care of the beneficent Father of all!”

The following interesting description of the **SOUTH-WEST MONSOON IN INDIA**, is taken from Elphinstone's Account of Cabul.—The most remarkable rainy season, is that called in India the South-west Monsoon. It extends from Africa to the Malay Peninsula, and deluges all the intermediate countries within certain lines of latitude, for four months in the year. In the south of India, this monsoon commences about the beginning of June, but it gets later as we advance towards the north. Its approach is announced by vast masses of clouds that rise from the Indian ocean, and advance towards the north-east, gathering and thickening as they approach the land. After some threatening days, the sky assumes a troubled

appearance in the evenings, and the monsoon in general sets in during the night. It is attended with such a thunder-storm as can scarcely be imagined by those who have only seen that phenomenon in a temperate climate. It generally begins with violent blasts of wind, which are succeeded by floods of rain. For some hours, lightning is seen almost without intermission; sometimes it only illuminates the sky, and shews the clouds near the horizon; at others, it discovers the distant hills, and again leaves all in darkness; when in an instant it re-appears in vivid and successive flashes, and exhibits the nearest objects in all the brightness of day. During all this time the distant thunder never ceases to roll, and is only silenced by some nearer peal, which bursts on the ear with such a sudden and tremendous crash, as can scarcely fail to strike the most insensible heart with awe. At length the thunder ceases, and nothing is heard but the continued pouring of the rain, and the rushing of the rising streams. The next day presents a gloomy spectacle: the rain still descends in torrents, and scarcely allows a view of the blackened fields; the rivers are swollen and discoloured, and sweep down along with them the hedges, the huts, and the remains of the cultivation, which was carried on during the dry season, into their beds.

This lasts for some days, after which the sky clears, and discovers the face of nature, changed as if by enchantment. Before the storm, the fields were parched up, and, except in the beds of the rivers, scarce a blade of vegetation was to be seen; the clearness of the sky was not interrupted by a single cloud, but the atmosphere was loaded with dust, which was sufficient to render distant objects dim, as in a mist, and to make the sun appear dull and discoloured, till he attained a considerable elevation: a parching wind blew like a blast from a furnace, and heated wood, iron, and every other solid material, even in the shade; and immediately before the monsoon, this wind had been succeeded by still more sultry calms. But when the first violence of the storm is over, the whole earth is covered with a sudden but luxuriant verdure: the rivers are full and tranquil, the air is pure and delicious; and the sky is varied, and embellished with clouds. The effect of the change is visible on all the animal creation, and can only be imagined in Europe, by supposing the depth of a dreary winter to start at once into all the freshness and brilliancy of spring. From this time the rain falls at intervals for about a month, when it comes on again with great violence, and in July the rains are at their height; during the third month, they rather diminish, but are still heavy; and in September they gradually abate, and are often entirely suspended till near the end of the month, when they depart amidst thunders and tempests, as they came.

The following Table, which gives some particulars respecting the VELOCITY OF THE WIND, was calculated by Mr. John Smeaton, the celebrated engineer, and is founded on a correct series of practical observations:—

Miles per hour. Feet per second.

1	1.47		
2	2.93	}	Light airs.
3	4.40		
4	5.87		
5	7.33	}	Breeze.
10	14.67		
15	22.	}	Brisk gale.
20	29.34		
25	36.67	}	Fresh gale.
30	40.01		
35	51.34	}	Strong gale.
40	58.68		
45	66.01	}	Hard gale.
50	73.35		
60	88.02	}	Storm.
80	117.36		
100	146.70	}	Hurricane, tearing up trees, &c.

We conclude this chapter with a poetical enumeration of the benefits arising from the wind:—

“Of what important use to human kind,
To what great ends subservient, is the wind!
Where'er the ærial active vapour flies,
It drives the clouds, and ventilates the skies;
Sweeps from the earth infection's noxious train,
And swells to wholesome rage the sluggish main.
For should the sea unagitated stand,
Death, with huge strides, would desolate the land;
The scorching sun, with unpropitious beam,
Would give to grief an everlasting theme;
And baneful vapours, lurking in the veins,
Would fiercely burn with unabating pains.
Nor thus alone air purifies the seas.
O'er torrid climes it pours the healthful breeze:
Climes where the sun direct flings scorching day
Feel cooling air his sultry rage allay;
Unceasing goodness, with unceasing skill,
Educing certain good from seeming ill.
His guardian care extends o'er ev'ry shore,
And blends his favours with what men deplore.
The sable nations hence, and burning skies,
See luscious fruits in varying beauty rise;
Spontaneous Nature laugh at culture's toil,
And rich luxuriance bless the grateful soil.”

CHAP. L.

CURIOSITIES RESPECTING SHOWERS, STORMS, &c.

Surprising Showers of Hail—Singular Effects of a Storm—The Mirage—Sand Floods—Showers of Gossamers—Winter in Russia.

Ye vapours, hail, and snow,
Praise ye th' Almighty LORD,
And stormy winds that blow
To execute his word.

Watts.

Then from ærial treasures downwards pours
Sheets of unsully'd snow in lucid show'rs;
Flake after flake, thro' air thick wav'ring flies
'Till one vast shining waste all nature lies.
Then the proud hills a virgin whiteness shed,
A dazzling brightness glitters from the mead;
The hoary trees reflect a silver show,
And groves beneath the lovely burden low.

Broome.

SURPRISING SHOWERS OF HAIL.

NATURAL historians record various instances of surprising showers of hail, in which the hailstones were of extraordinary magnitude. Mezeray, speaking of the war of Lewis XII. in Italy, in 1510, relates, that there was for some time a horrible darkness, thicker than that of night; after which the clouds broke into thunder and lightning, and there fell a shower of hailstones, or rather (as he calls them) pebblestones, which destroyed all the fish, birds, and beasts, of the country. It was attended with a strong smell of sulphur; and the stones were of a bluish colour, some of them weighing 100lb.—*Hist. de France*, tom. ii. p. 339.

At Lisle, in Flanders, in 1686, hailstones fell of a very large size; some of which contained in the middle, a dark brown matter, which, thrown on the fire, gave a very great report.—*Phil. Trans.* No. 203.

Dr. Halley and others relate, that in Cheshire, Lancashire, &c. April 29, 1697, a thick black cloud, coming from Carnarvonshire, disposed the vapours to congeal in such a manner, that for about the breadth of two miles, which was the limit of the cloud, in its progress for sixty miles it did inconceivable damage; not only killing all sorts of fowls and other small animals, but splitting trees, knocking down horses and men, and even ploughing up the earth so that the hailstones buried themselves under ground an inch or an inch and a half deep. The hailstones, many of which weighed five ounces and some half a pound, being five or six inches in circumfe-

rence, were of various figures; some round, others half round; some smooth, others embossed and crenated; the icy substance of them was very transparent and hard, but there was a snowy kernel in the centre.

In Hertfordshire, May 4, 1697, after a severe storm of thunder and lightning, a shower of hail succeeded, which far exceeded the former: some persons were killed by it, their bodies beat all black and blue; vast oaks were split, and fields of rye cut down as with a scythe. The stones measured from ten to fourteen inches round. Their figures were various, some oval, some flat, &c.—*Phil. Trans.* No. 229.

The following account of the SINGULAR EFFECTS OF A STORM, was communicated to the Dublin Philosophical Society, by the secretary:—

“Mrs. Close gave Mr. Molyneux the following account of the effects of thunder and lightning on her house at New Forge, in the county of Down, in Ireland, on August 9, 1707: She observed, that the whole day was close, hot, and sultry, with little or no wind stirring till towards the evening, when there was a small breeze, with some mizzling rain, which lasted about an hour; that as the air darkened after sunset, she saw several faint flashes of lightning, and heard some thunder-claps at a distance; that between ten and eleven o’clock, both were very violent and terrible, and so increased, and came on more frequently until a little before twelve o’clock; that one flash of lightning and clap of thunder came both at the same time, louder and more dreadful than the rest, which, as she thought, shook and inflamed the whole house; and being sensible at that instant of a violent strong sulphureous smell in her chamber, and feeling a thick gross dust falling on her hands and face as she lay in bed, she concluded that part of her house was thrown down by the thunder, or set on fire by the lightning; that, arising in this fright, she called up her family, and candles being lighted, she found her bed-chamber, and the kitchen beneath it, full of smoke and dust, and the looking-glass in her chamber was broken.

“The next day she found, that part of the cornice of the chimney, which stood without the gable-end of the house where her chamber was, had been struck off; that part of the coping of the splay of the gable-end itself was broken down and twelve or sixteen of the shingles on the adjoining roof were raised or ruffled, but none shattered or carried away; that a part of the ceiling in her chamber beneath those shingles was forced down, and part of the plaster and pinning stones of the adjoining wall was also broken off and loosened, the whole breach being sixteen or twenty inches broad; that at this place there was left on the wall a smutted scar or trace, as it

blackened by the smoke of a candle, which pointed downwards towards another place on the same wall, where a like breach was made, partly behind the place of the looking-glass; that the boards on the back of a large hair-trunk, full of linen, standing beneath the looking-glass, were forced in, and splintered as if by the blow of a smith's sledge; that two-thirds of the linen within this trunk were pierced or cut through, the cut appearing of a quadrangular figure, and between two or three inches over; that one end of the trunk was forced out, as the back was driven in; that at about two feet distance from the end of the trunk, where the floor and the side-wall of the house joined, there was a breach made in the plaster, where a small chink or crevice was to be seen between the sideboard of the floor and the wall, so wide that a man could thrust his fingers down; and that just beneath this, in the kitchen, the ceiling was forced down, and some of the plaster of the wall broken off; that exactly under this there stood a large tub or vessel of wood, inclosed with a crib of brick and lime, which was broken and splintered all to pieces, and most of the brick and lime work of it scattered about the kitchen.

"The looking-glass was broken with such violence, that there was not a piece of it to be found of the size of half-a-crown, and several pieces of it were sticking like hail-shot in the chamber door, which was of oak, and on the other side of the room; several of the edges and corners of some of the pieces of the broken glass were tinged of a light flame colour, as if heated in the fire; the curtains of the bed were cut in several places, supposed to be done by the pieces of the glass. Several pieces of muslin and wearing linen, left on the large hair-trunk, were thrown about the room, no way singed or scorched, and yet the hair on the back of the trunk, where the breach was made, was singed; the uppermost part of the linen within the trunk was not touched, and the lowermost parcel, consisting of more than 350 ply of linen, was pierced through, of which none was anywise smutted, except the uppermost ply of a tablecloth, that lay over all the rest; there was a yellow tinge or stain perceivable on some part of the damaged linen, and the whole smelt strongly of sulphur; the glass of two windows in the bed-chamber above, and two windows in the kitchen below, were so shattered, that there was scarcely one whole frame left, in many of them. The pewter, brass, and iron furniture in the kitchen, were thrown down, and scattered about; particularly, a large girdle, about twenty pounds weight, that hung upon an iron hook near the ceiling, was found lying on the floor. A cat was found dead next morning in the kitchen, with her legs extended in a moving posture, with no other sign of being hurt, than that the fur was singed a little about the rump.

"It was further remarkable, that the wall, both above and below a little window in the same gable-end, was so shattered, that the light could be seen through the crevices in the wall, and upon a large stone on the outside of the wall; beneath this window was a mark, as if made by the stroke of a smith's sledge, and a splinter of the stone was broken off, of some pounds weight. I was further informed, that from the time of the great thunder-clap, both the thunder and lightning diminished gradually, so that in an hour's time all was still and quiet again."

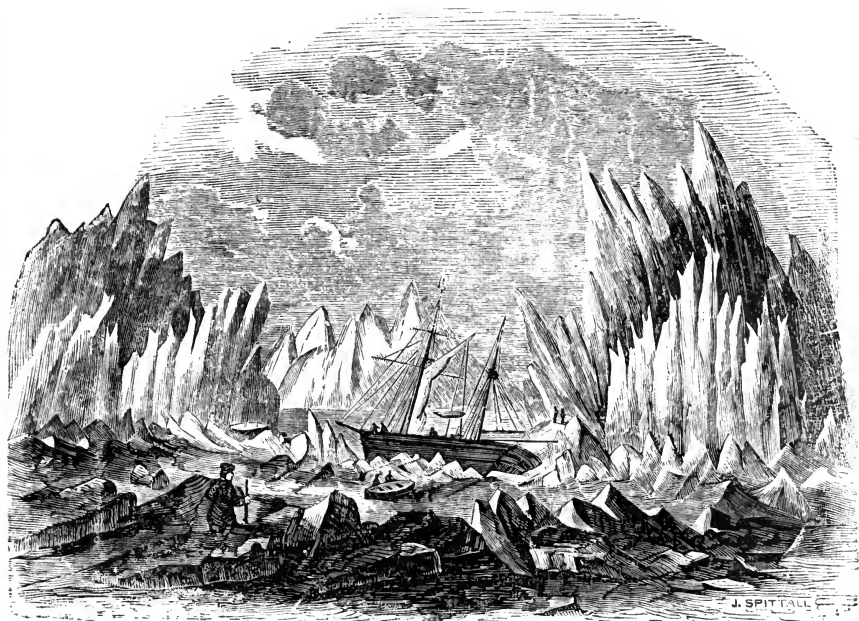
We proceed to give an account of THE MIRAGE.—From Belzoni's Narrative.

"This phenomenon is often described by travellers, who assert having been deceived by it, as at a distance it appears to them like water. This is certainly the fact, and I must confess that I have been deceived myself, even after I was aware of it. The perfect resemblance to water, and the strong desire for this element, made me conclude, in spite of all my caution not to be deceived, that it was really water I saw. It generally appears like a still lake, so unmoved by the wind, that every thing above it is to be seen most distinctly reflected, which is the principal cause of the deception. If the wind agitate any of the plants that rise above the horizon of the mirage, the motion is seen perfectly at a great distance. If the traveller stands elevated much above the mirage, the water seems less united and less deep, for, as the eyes look down upon it, there is not thickness enough in the vapour of the surface of the ground to conceal the earth from the sight; but if the traveller be on a level with the horizon of the mirage, he cannot see through it, so that it appears to him clear water. By putting my head first to the ground, and then mounting a camel, the height of which from the ground might have been ten feet at the most, I found a great difference in the appearance of the mirage. On approaching it, it becomes thinner, and appears as if agitated by the wind, like a field of ripe corn. It gradually vanishes as the traveller approaches, and at last entirely disappears when he is on the spot."

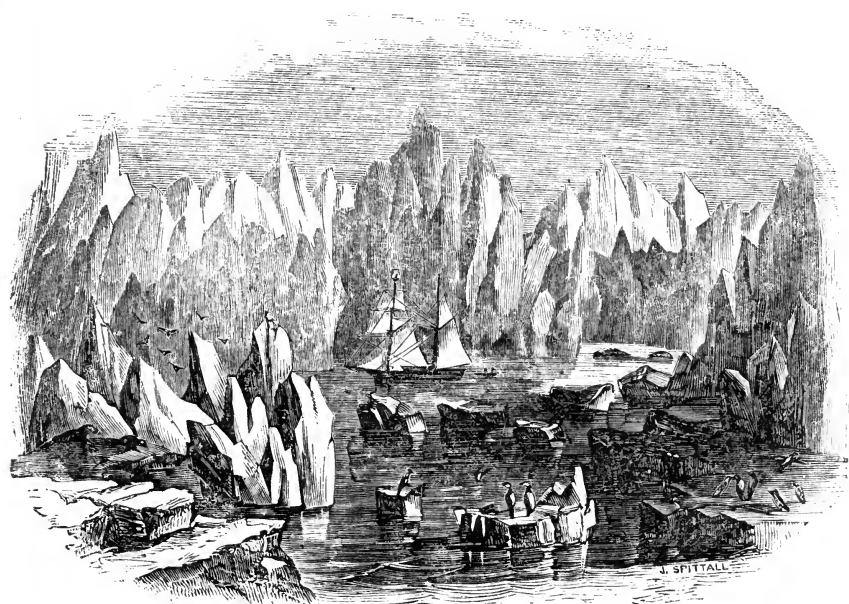
We shall now introduce to the reader a curious account of SAND FLOODS; a name given to the flowing of sand so common in the deserts of Arabia. Mr. Bruce gives the following description of some that he saw in travelling through that long and dreary desert.—"At one o'clock (says he) we alighted among some acacia trees at Waadi el Halboub, having gone twenty-one miles. We were here at once surprised and terrified by a sight, surely one of the most magnificent in

the world. In that vast expanse of desert from west to north-west of us, we saw a number of prodigious pillars of sand at different distances, at times moving with great celerity, at others stalking on with a majestic slowness: at intervals we thought they were coming in a few minutes to overwhelm us; and small quantities of sand did actually more than once reach us. Again they would retreat so as to be almost out of sight, their tops reaching to the very clouds. Here the tops often separated from the bodies; and these, once disjoined, dispersed in the air, and did not appear more. Sometimes they were broken near the middle, as if struck with a large cannon-shot. About noon they began to advance with considerable swiftness upon us, the wind being very strong at north. Eleven of them ranged alongside of us about the distance of three miles. The greatest diameter of the largest appeared to me, at that distance, as if it would measure ten feet. They retired from us with a wind at south-east, leaving an impression upon my mind to which I can give no name, though surely one ingredient in it was fear, with a considerable deal of wonder and astonishment. It was in vain to think of flying; the swiftest horse, or fastest sailing ship, could not carry us out of this danger; and the full persuasion of this riveted me as if to the spot where I stood, and let the camels gain on me so much in my state of lameness, that it was with some difficulty I could overtake them. The same appearance of moving pillars of sand presented themselves to us this day, in form and disposition like those we had seen at Waadi el Halboub, only they seemed to be more in number and less in size. They came several times in a direction close upon us, that is, I believe, within less than two miles. They became, immediately after sun-rise, like a thick wood, and almost darkened the sun: his rays shining through them for near an hour, gave them an appearance of pillars of fire. Our people now became desperate: the Greek shrieked out, and said it was the day of judgment; Ismael pronounced it to be hell; and the Tucorories, that the world was on fire. I asked Idris if ever he had before seen such a sight? He said he had often seen them as terrible, though never worse; but what he feared most was that extreme redness in the air, which was a sure presage of the coming of the simoom."

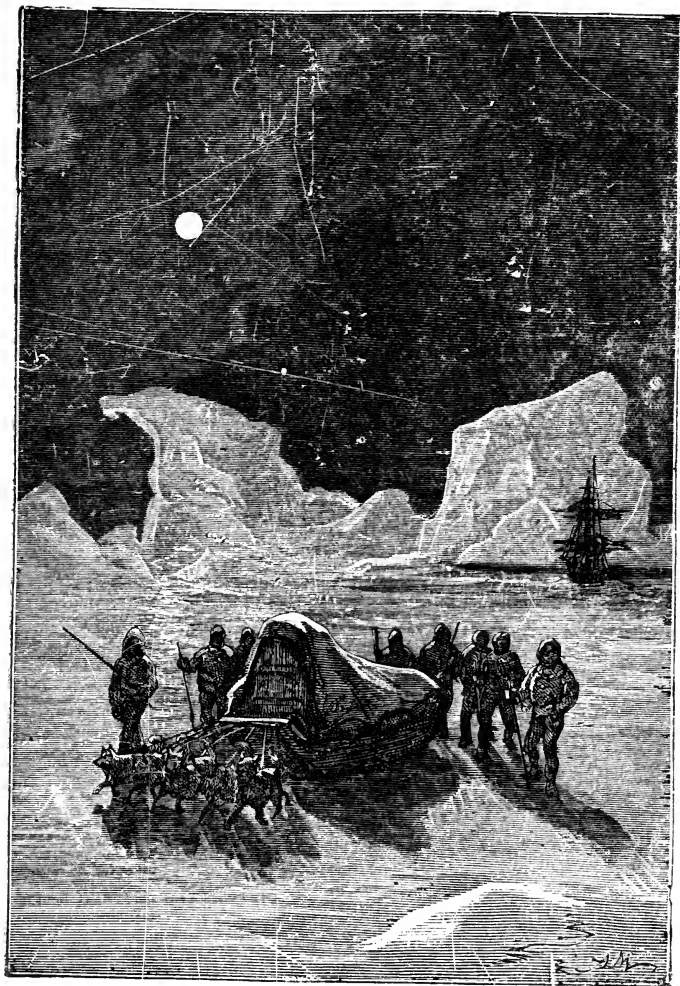
The flowing of sand, though far from being so tremendous and hurtful as in Arabia, is of very bad consequences in Britain, as many valuable pieces of land have thus been entirely lost; of which we give the following instances from Mr. Pennant, together with a probable means of preventing them in future.—"I have more than once (says he) on the east coasts of Scotland, observed the calamitous state of several extensive tracts, formerly in a most flourishing condition, at present



ICEBERGS OF GREENLAND.



ICEBERGS OF SPITZBERGEN.



TRAVELING IN THE ARCTIC REGIONS.

covered with sands, unstable as those of the deserts of Arabia. The parish of Fyrie, in the county of Aberdeen, is now reduced to two farms, and above five hundred pounds a year lost to the Errol family, as appears by the oath of the factor in 1600, made before the court of session, to ascertain the minister's salary: not a vestige is to be seen of any buildings, unless a fragment of the church. The estate of Coubin, near Forres, is another melancholy instance. This tract was once worth three hundred pounds a year, but at this time is overwhelmed with sand. This strange inundation was still in motion in 1769, chiefly when a strong wind prevailed. Its motion is so rapid, that I have been assured, that an apple-tree has been so covered with it one season, that only the very summit appeared. This distress was brought on about ninety years ago and was occasioned by the cutting down some trees, and pulling up the bent or star which grew on the sand-hills; which at last gave rise to the act of 15 George II. c. 33. to prohibit the destruction of this useful plant.

"I beg leave to suggest to the public a possible means of of putting a stop to these destructive ravages. Providence has kindly formed this plant to grow only in pure sand. Mankind was left to make, in after times, an application of it suitable to their wants. The sand-hills on a portion of the Flintshire shores, in the parish of Llanasa, are covered with it naturally, and kept firm in their place. The Dutch perhaps owe the existence of part at least of their country, to the sowing of it on the *mobile solum*, their sand-banks. My humane and amiable friend, the late Benjamin Stillingfleet, Esq. recommended the sowing of this plant on the sandy wilds of Norfolk, that its matted roots might prevent the deluges of sand which that country experiences. It has been already remarked, that wheresoever this plant grows, the salutary effects are soon observed to follow. A single plant will fix the sand, and gather it into a hillock; these, by the increase of vegetation, are formed into larger, till by degrees a barrier is often made against the encroachments of the sea, and might often prove preventive of the calamity in question. I cannot, therefore, but recommend the trial to the inhabitants of many parts of North Britain: the plant grows in most places near the sea, and is known to the Highlanders by the name of *murah*, and to the English by that of *bent-star*."

The following is a singular but authentic account of the curious phenomenon of a SHOWER OF GOSSAMERS.—From White's Natural History of Selborne.

"On September 21, 1741, being intent on field diversions, I rose before daybreak: when I came into the inclosures, I found the stubbles and clover grounds matted all over with a

thick coat of cobweb, in the meshes of which a copious and heavy dew hung so plentifully, that the whole face of the country seemed, as it were, covered with two or three setting nets, drawn one over another. When the dogs attempted to hunt, their eyes were so blinded and hoodwinked, that they could not proceed, but were obliged to lie down and scrape the incumbrances from their faces with their fore feet. As the morning advanced, the sun became bright and warm, and the day turned out one of those most lovely ones, which no season but the autumn produces; cloudless, calm, serene, and worthy the south of France itself. About nine, an appearance, very unusual, began to demand our attention; a shower of cobwebs falling from very elevated regions, and continuing without any interruption till the close of day. These webs were not single filmy threads, floating in the air in all directions, but perfect flakes or rags, some near an inch broad, and five or six long. On every side, as the observer turned his eyes, might he behold a continual succession of fresh flakes falling into his sight, and twinkling like stars as they turned their sides towards the sun. Neither before nor after, was any shower observed; but on this day the flakes hung on the trees and hedges so thick, that a diligent person might have gathered baskets full."

This chapter closes with a description of WINTER IN RUSSIA.—The winter, in the climate of Russia, approaches very suddenly. There is something very wonderful in the instantaneous change of weather about the time of winter. On one day the warmth shall be that of spring, while on the following day the winter shall break forth in all its horrors; snow and ice are spread in the course of a few hours, and the abruptness of this instant change affects even a Russian constitution. Nothing can defend the shivering inhabitant, but the artificial heat of his own house; where he seals himself up during the hibernal rigours, yet even there they reach him.

There is a pleasing description of these sudden winters in one of the letters of the poet Metastasio, while residing at Vienna. The passage is very interesting, and finely describes the instantaneous change which occurred.

"Within these few days the Teutonic winter has unexpectedly appeared, with all his magnificent train, and without the least precursor to announce his arrival. All is covered with snow. The rivers, as well as lakes, were instantly frozen in a most solid manner; and the cold blown from the seven neighbouring hills is so subtle and penetrating, that we cannot exclude it from our warmest apartment. But notwithstanding all this unforeseen and violent change of nature, I still find,

much amusement here, having been more formed for Arcadian tranquillity than the bustle and magnificence of courts. I am pleased with the silent concord of all existence; the roving about in search of well-known paths, fields, bushes, pastoral borders, and every known object, of which, though the fall of snow has changed the colouring, yet the design is still faithfully preserved. I reflect with sentiments of gratitude, that the friendly forest, which by its shade but lately defended me from the burning rays of the sun, now affords me materials for combating the extreme fury of the season. I laugh at winter with all its horrors, which I see without feeling, having it in our power to compose an artificial spring in our apartments at pleasure; but by an impulse of self-love, what pleases me more is, the finding out, that, compared with other seasons, winter has still its conveniences, beauties, and advantages."

CHAP. LI.

CURIOSITIES RESPECTING ICE.

On the Greenland, or Polar Ice—On the Tremendous Concussion of Fields of Ice—Icebergs—Magnitude of Icebergs—The Glaciers—Shower of Ice—Remarkable Frosts.

There winter, arm'd with terrors here unknown,
Sits absolute on his unshaken throne;
Piles up his stores amid the frozen waste,
And bids the mountains he has built, stand fast;
Beckons the legions of his storms away
From happier scenes, to make this land a prey;
Proclaims the soil a conquest he has won,
And scorns to share it with the distant sun.

Cowper.

Another poet thus describes the polar regions:—

Vast regions, dreary, bleak, and bare!
There on an icy mountain's height,
Seen only by the moon's pale light,
Stern winter rears his giant form,
His robe a mist, his voice a storm:
His frown the shiv'ring nations fly,
And, hid for half the year, in smoky caverns lie.

Scott.

THE GREENLAND, OR POLAR ICE.

THE following account of the Greenland, or Polar Ice, is abridged by the Editor of this work from a paper, by W. Scoresby, jun. M. W. S. published in The Memoirs of the Wernerian Natural-History Society:—

“Greenland is a country where every object is strikingly singular, or highly magnificent. The atmosphere, the land, and the ocean, each exhibit remarkable or sublime appearances.

“With regard to the atmosphere, several peculiarities may be noticed, viz. its darkness of colour, and density; its frequent production of crystallized snow in a wonderful perfection and variety of form and texture; and its astonishingly sudden changes from calm to storm, from fair weather to foul, and *vice versâ*.

“The land is of itself a sublime object; its stupendous mountains rising by steep acclivities from the very margin of the ocean to an immense height, terminating in rigid, conical, or pyramidal summits; its surface, contrasting its native protruding dark-coloured rocks, with its burden of purest snow;—the whole viewed, under the density of a gloomy sky, forms a picture impressive and grand.

“Of the inanimate productions of Greenland, none perhaps excites so much interest and astonishment in a stranger, as the ice, in its great abundance and variety. The stupendous masses known by the name of Ice Islands, Floating Mountains, or Icebergs, common to Davis’ Straits, and sometimes met with here, from their height, various forms, and the depth of water in which they ground, are calculated to strike the beholder with wonder: yet the fields of ice, more peculiar to Greenland, are not less astonishing. Their deficiency in elevation is sufficiently compensated by their amazing extent of surface. Some of them have been observed near 100 miles in length, and more than half that breadth; each consisting of a single sheet of ice, having its surface raised in general four or six feet above the level of the water, and its base depressed to the depth of nearly twenty feet beneath.

The various kinds of Ice described.—“The ice in general is designated by a variety of appellations, distinguishing it according to the size or number of pieces, their form of aggregation, thickness, transparency, &c. I perhaps cannot better explain the terms in common acceptance amongst the whale-fishers, than by marking the disruption of a field. The thickest and strongest field cannot resist the power of a heavy swell; indeed, such are much less capable of bending without being dissevered, than the thinner ice, which is more pliable. When a field, by the set of the current, drives to the southward, and, being deserted by the loose ice, becomes exposed to the effects of a ground swell, it presently breaks into a great many pieces, few of which will exceed forty or fifty yards in diameter. Now, such a number of these pieces collected together in close contact, so that they cannot, from the top of the ship’s mast, be seen over, are termed a *pack*

"When the collection of pieces can be seen across, if it assume a circular or polygonal form, the name of *patch* is applied, and it is called a *stream* when its shape is more of an oblong, how narrow soever it may be, provided the continuity of the pieces is preserved.

"Pieces of very large dimensions, but smaller than fields, are denominated *floes*: thus, a field may be compared to a pack, and a floe to a patch, as far as regards their size and external form.

"Small pieces which break off, and are separated from the larger masses by the effect of attrition, are called *brash-ice*, and may be collected into streams or patches.

"Ice is said to be loose or open, when the pieces are so far separated as to allow a ship to sail freely amongst them: this has likewise been called *drift-ice*.

"A *hummock* is a protuberance raised upon any plane of ice above the common level. It is frequently produced by pressure, where one piece is squeezed upon another, often set upon its edge, and in that position cemented by the frost. Hummocks are likewise formed by pieces of ice mutually crushing each other, the wreck being heaped upon one or both of them. To hummocks, the ice is indebted for its variety of fanciful shapes, and its picturesque appearance. They occur in great numbers in heavy packs, on the edges, and occasionally in the middle of, fields and floes. They often attain the height of thirty feet or upwards.

"A *calf*, is a portion of ice which has been depressed by the same means as a hummock is elevated. It is kept down by some larger mass, from beneath which it shews itself on one side. I have seen a calf so deep and broad, that the ship sailed over it without touching, when it might be observed on both sides of the vessel at the same time: this, however, is attended with considerable danger, and necessity alone warrants the experiment, as calves have not unfrequently (by a ship's touching them, or disturbing the sea near them) been called from their submarine situation to the surface, and with such an accelerated velocity, as to stave the planks and timbers of the ship, and in some instances to reduce the vessel to a wreck.

"Any part of the upper superficies of a piece of ice, which comes to be immersed beneath the surface of the water, obtains the name of a *tongue*.

"A *bight* signifies a bay or sinuosity, on the border of any large mass or body of ice. It is supposed to be called bight, from the low word *bite*, to take in, or entrap; because, in this situation, ships are sometimes so caught by a change of wind, that the ice cannot be cleared on either tack; and in some cases, a total loss has been the consequence."

ON THE TREMENDOUS CONCUSSIONS OF FIELDS OF ICE.—The occasional rapid motion of fields, with the strange effects produced on any opposing substance, exhibited by such immense bodies, is one of the most striking objects this country presents, and is certainly the most terrific. They not unfrequently acquire a rotary movement, whereby the circumference attains a velocity of several miles per hour. A field, thus in motion, coming in contact with another at rest, or, more especially, with a contrary direction of movement, produces a dreadful shock. The consequences of a body of more than ten thousand millions of tons in weight, meeting with resistance when in motion, may be better conceived than expressed! The weaker field is crushed with an awful noise; sometimes the destruction is mutual: pieces of huge dimensions and weight are not unfrequently piled upon the top, to the height of twenty or thirty feet, whilst doubtless a proportionate quantity is depressed beneath. The view of these stupendous effects, in safety, exhibits a picture sublimely grand; but where there is danger of being overwhelmed, terror and dismay must be the predominant feelings. The whale-fishers at all times require unremitting vigilance to secure their safety, but scarcely in any situation so much, as when navigating amidst those fields: in foggy weather, they are particularly dangerous, as their motions cannot then be distinctly observed. It may easily be imagined, that the strongest ship can no more withstand the shock of two fields, than a sheet of paper can stop a musket-ball. Numbers of vessels, since the establishment of the fishery, have been thus destroyed; some have been thrown upon the ice, some have had their hulls completely torn open, and others have been buried beneath the heaped fragments of the ice.

ICEBERGS.—"The term *icebergs* has commonly been applied to those immense bodies of ice situated on the land, 'filling the valleys between the high mountains,' and generally exhibiting a square perpendicular towards the sea. They recede backward inland to an extent never explored. Martin, Crantz, Phipps, and others, have described those wonders of nature, and all agree as to their manner of formation, in the congelation of the sleet and rains of summer, and of the accumulated snow, partly dissolved by the summer sun, which, on its decline, freezes to a transparent ice. They are as permanent as the rocks on which they rest: for although large portions may be frequently separated, yet the annual growth replaces the loss, and probably on the whole, produces a perpetual increase. I have seen those styled the *Seven Icebergs*, situated in the valleys of the north-west coast of Spitzbergen; their perpendicular front may be about 300 feet in height, the green

colour, and glistening surface of which, form a pleasing variety in prospect, with the magnificence of the encompassing snow-clad mountains, which, as they recede from the eye, seem to rise 'crag above crag,' in endless perspective.

"Large pieces may be separated from those icebergs in the summer season, when they are particularly fragile, by their ponderous overhanging masses overcoming the force of cohesion; or otherwise, by the powerful expansion of the water, filling any excavation or deep-seated cavity, when its dimensions are enlarged by freezing, thereby exerting a tremendous force, and bursting the whole asunder.

"Pieces thus or otherwise detached, are hurled into the sea with a dreadful crash: if they are received into deep water, they are liable to be drifted off the land, and, under the form of ice-islands, or ice-mountains, they likewise still retain their parent name of icebergs. I much question, however, if all the floating bergs seen in the seas west of Old Greenland, thus derive their origin, their number being so great, and their dimensions so vast."

MAGNITUDE OF ICEBERGS.—"If all the floating islands of ice thus proceed from disruptions of the icebergs generated on the land, how is it that so few are met with in Greenland, and those comparatively so diminutive, whilst Baffin's Bay affords them so plentifully, and of such amazing size? The largest I ever saw in Greenland, was about 1000 yards in circumference, nearly square, of a regular flat surface, twenty feet above the level of the sea; and as it was composed of the most dense kind of ice, it must have been 150 or 160 feet in thickness, and in weight about 2,000,000 of tons. But masses have been repeatedly seen in Davis' Straits, nearly two miles in length, and one-third as broad, whose rugged mountain summits were reared with various spires to the height of more than 100 feet, whilst their base must have reached to the depth of 150 yards beneath the surface of the sea. Others, again, have been observed, possessing an even surface of five or six square miles in area, elevated thirty yards above the sea, and fairly run aground in water of 90 or 100 fathoms in depth; the weight of which must have been upwards of two thousand millions of tons."

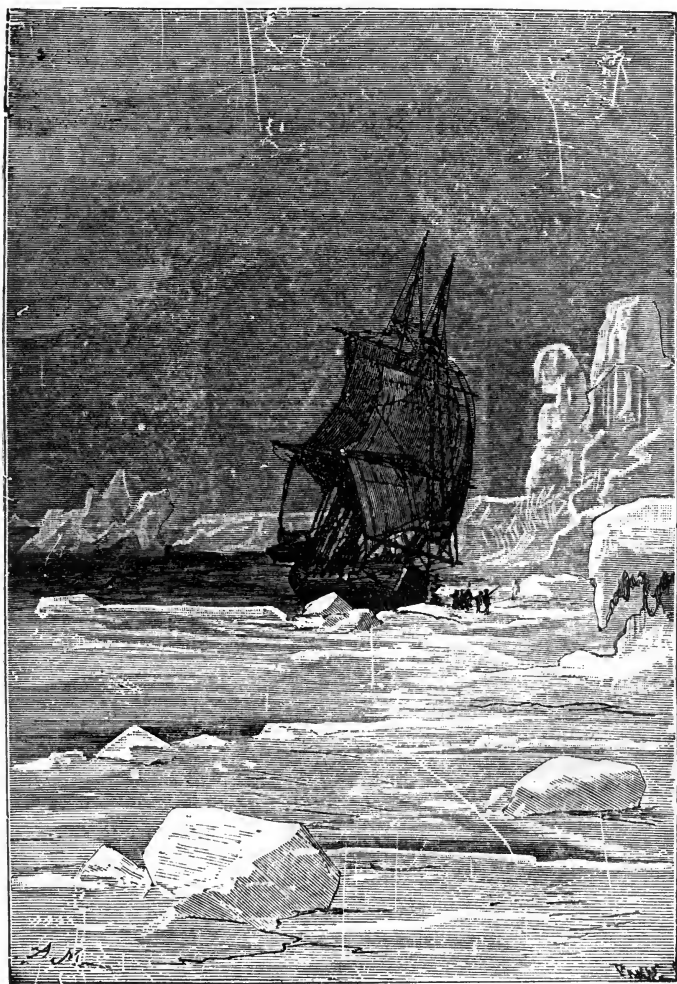
THE GLACIERS.—Those vast piles of eternal ice with which it has pleased the Author of nature to crown the immense chasms between the summits of the Alps, are objects more grand, sublime, and terrific, than any others of the phenomena of nature which remain stationary. These tremendous spires and towers, of uncertain and brittle fabric, seem to forbid the attempts of travellers to explore the depth between them, or

even the rocks and rich valleys around them; but courage and perseverance have been attended with commensurate success, and we are enabled by their labours to learn previously concealed wonders, and to reason upon the causes which produced them.

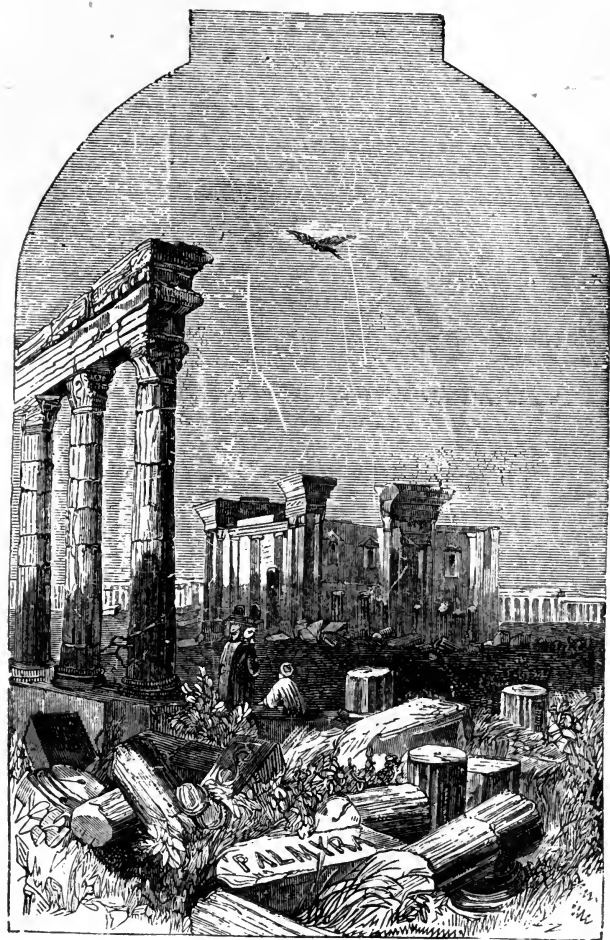
Mr. Bourrit, precentor of the cathedral church at Geneva, mentions, in the relation of his journey to the glaciers of Savoy, the enterprise of Messrs. Windham and Pocock, in 1741, who, inspired by the artless relations of the peasants, descriptive of the sublimity of their country, when they descended with honey and crystals for sale, determined to visit those frightful regions of ice which had received the appellation of *Les Montagnes Maudites*; or the Accursed Mountains. The gentlemen alluded to took every precaution for securing their safety; but entertaining many well-grounded fears, naturally arising from a first attempt, they did not reach any considerable distance beyond the edge of the ice in the valley of Montanvert, yet their example operated so powerfully as to induce several others to imitate them, and proceed to the boundary whence they returned: at length M. de Saussure had the resolution and courage to penetrate across the ice to the very extremities of the valleys; Mr. Coxe followed soon after: and from their publications every possible information may be obtained, of which the nature of the subject will admit.

The most astonishing phenomenon attending the glaciers, is their near approach to the usual vegetation of summer; for what can be more wonderful than to view wheat ready for the sickle, parched brown by the rays of the sun, and separated only by the intervention of a few feet, from the chilling influence of an endless bed of ice, which seems impenetrable to its rays.

Many systems and theories have been ingeniously suggested, to ascertain the first cause of the glaciers, their maintenance, and whether they increase or diminish in extent; of which, Gruner's, improved and illustrated with actual observations by M. de Saussure, is the most rational and probable, and Mr. Coxe implicitly adopts it. Admitting that a person could be raised sufficiently above the summits of the Alps of Switzerland, Savoy, and Dauphiny, to comprehend the whole at one view, he would observe a vast chaos of mountains and valleys, with several parallel chains, the highest of which are situated in the centre, and the remainder gradually lessening as they retire from it. The central chain he would find to be surmounted by stupendous fragments of rock, towering in rude masses, which bear vast accumulations of snow and ice, where they are not decidedly perpendicular, or do not overhang their bases: on each side he would see the intervening chasms and gulfs, filled with ice, descending thence even



NAVIGATING AMONG THE ICEBERGS.



PALMYRA

into the verdant valleys, rich with foliage and cultivation. The inferior ranges of mountains, next the central, present the same appearance in a less degree; but in those more remote, the snow and ice are confined to the most elevated points; and others, still further removed, are covered with grass and plants, which, in their turn, give place to such hills and valleys as are common in any part of the world.

Mr. Coxe divides the glaciers, in the above general survey, into two classes: the first occupy the deep valleys situated in the bosom of the Alps, and the second adhere to the sides and summits of the mountains. Those in the valleys are far more extensive than the upper glaciers; some are several leagues in length; and that of Des Bois is three miles broad and fifteen long: but they do not communicate with each other, and there are few parallel to the central chain; their upper extremities are connected with inaccessible precipices, and the lower proceed, as already mentioned, quite into the vales. The depth of these astonishing accumulations of frozen fluid vary from eighty to six hundred feet, and they generally rest on an inclined plane, where, urged forward by their own enormous weight, and but weakly supported by the pointed rocks inserted in their bases, they are universally intersected by yawning chasms, of dreadful aspect to the curious investigator, who beholds fanciful representations of walls, towers, and pyramids, on every side of him; but upon reaching those parts where the glacier rests upon an horizontal plane, his progress is seldom impeded by considerable fissures, and he walks in safety over a surface nearly uniform, and not so perfectly polished as that of ponds and rivers suddenly and violently frozen.

The absence of transparency, the various marks of air-bubbles, and the general roughness, so perfectly resemble the congelation of snow when half-restored to fluidity, that M. de Saussure was immediately led to form the following probable theory of the formation of the glaciers. Snow is constantly accumulating in the recesses or depths of the mountains, during nine months of the year, by the usual fall of moisture, and the descent of vast masses, borne down by their weight, from the precipices and crags above. Part of this is necessarily reduced to water by slight thaws and casual rains, and, being frozen in this state, the glacier is composed of a porous opaque ice.

The upper glaciers Mr. Coxe subdivides into those which cover the summits, and those which extend along the sides of the Alps; the former originate from the snow frequently falling and congealing into a firm body, though not becoming actual ice, which the brilliancy of the projections has induced some philosophers to suppose it to be. M. de Saussure, having

explored Mont Blanc, ascertained that the top was encrusted with ice, (which might be penetrated by a stick,) covering a mass of snow on the declivities, so chilled and dry as to be incapable of coherence.

The sides of the Alps support a congelation of half-dissolved snow, which is different from the pure snow of the summits, and the ice of the lower glaciers. Two causes operate to produce this effect; the first is the descent of water from the higher regions, where a dissolution of snow sometimes occurs; and the second arises from the more favourable situation of these parts for reflecting the rays of the sun, and the consequent melting of the snow. From hence downwards, the ice adhering to the cavities becomes gradually more solid by the freezing of the snow-water, then nearly divested of that air which in the less dissolved portions renders the ice, formed from it, porous, opaque, and full of bubbles.

An idea of the sublimity of the glaciers may be formed by reading the account of M. Bourrit, who appears to have viewed and described them with all that enthusiasm which such splendid objects must have inspired.—“To come at this collected mass of ice, (Des Bois,) we crossed the Arve, and travelling in a tolerable road, passed some villages or hamlets, whose inhabitants behaved with much politeness; they invited us to go in and rest ourselves, apologized for our reception, and offered us a taste of their honey. After amusing ourselves some time amongst them, we resumed our road, and entered a beautiful wood of lofty firs, inhabited by squirrels. The bottom is a fine sand, left there by the inundations of the Arveron; it is a very agreeable walk, and exhibits some extraordinary appearances. In proportion as we advanced into this wood, we observed the objects gradually to vanish from our sight; surprised at this circumstance, we were earnest to discover the cause, and our eyes sought in vain for satisfaction, till, having passed through it, the charm ceased. Judge of our astonishment, when we saw before us an enormous mass of ice, twenty times as large as the front of our cathedral of St. Peter, and so constructed, that we have only to change our situation to make it resemble whatever we please. It is a magnificent palace, cased over with the purest crystal; a majestic temple, ornamented with a portico; and columns of several shapes and colours; it has the appearance of a fortress, flanked with towers and bastions to the right and left; and at the bottom is a grotto, terminating in a dome of bold construction. This fairy dwelling, this enchanted residence, or cave of fancy, is the source of the Arveron, and of the gold which is found in the Arve. And if we add to all this rich variety, the ringing tinkling sound of water dropping

from its sides, with the glittering refraction of the solar rays, whilst tints of the most lively green, blue, yellow, or violet, have the effect of different compartments in the several divisions of the grotto, the whole is so theatrically splendid, so completely picturesque, so great and beautiful beyond imagination, that I can hardly believe the art of man has ever yet produced, or ever will produce, a building so grand in its construction, or so varied in its ornaments. Desirous of surveying every side of this mass, we crossed the river about four hundred yards from its source, and, mounting upon the rocks and ice, approached the vault; but while we were attentively employed in viewing all its parts, astonished at the sportiveness of nature, we cast our eyes at one considerable member of the pile above us, which was most unaccountably supported, for it seemed to be held by almost nothing: our imprudence was too evident, and we hastened to retreat; yet scarcely had we stepped back thirty paces, before it broke off all at once with a prodigious noise, and tumbled, rolling to the very spot where we were standing just before."

SHOWER OF ICE.—A very uncommon kind of shower fell in the west of England, in December 1672, whereof we have various accounts in the *Philos. Trans.*—"This rain, as soon as it touched any thing above ground, as a bough or the like, immediately settled into ice; and, by multiplying and enlarging the icicles, broke every thing down by its weight. The rain that fell on the ground immediately became frozen, without sinking into the snow at all. It made an incredible destruction of trees, beyond any thing mentioned in history. Had it concluded with a gust of wind, (says a gentleman who was on the spot,) it might have been of terrible consequence. I weighed the sprig of an ash tree, of just three-quarters of a pound, the ice on which weighed sixteen pounds. Some were frightened with the noise in the air, till they discerned that it was the clatter of icy boughs, dashed against each other."

Dr. Beale remarks, that there was no considerable frost observed on the ground during the above: whence he concludes, that a frost may be very intense and dangerous on the tops of some hills and plains; while at other places it keeps at two, three, or four feet distance above the ground, rivers, lakes, &c. and may wander about very furiously in some places, and be mild in others not far off. The frost was followed by glowing heats, and a wonderful forwardness of flowers and fruits.

We close this division with an account of **REMARKABLE FROSTS.**—In the year 220, a frost in Britain lasted five

months.—In 250, The Thames was frozen nine weeks.—291, Most rivers in Britain frozen six weeks.—359, Severe frost in Scotland for fourteen weeks.—508, The rivers in Britain frozen for two months.—558, Danube quite frozen over.—695, Thames frozen six weeks, and booths built on it.—759, Frost from Oct. 1 till Feb. 26 following.—827, Frost in England for nine weeks.—859, Carriages used on the Adriatic.—908, Most rivers in England frozen two months.—923, The Thames frozen thirteen weeks.—987, Frost lasted 130 days; begun Dec. 22.—998, Thames frozen five weeks.—1035, Severe frost on June 24: the corn and fruits destroyed.—1063, The Thames frozen fourteen weeks.—1076, Frost in England from Nov. till April.—1114, Several wooden bridges carried away by ice.—1205, Frost from Jan. 15 till March 22.—1407, Frost that lasted fifteen weeks.—1434, From Nov. 24 till Feb. 10, Thames frozen down to Gravesend.—1683, Frost for thirteen weeks.—1708-9, An extraordinary frost throughout the most parts of Europe, though scarcely felt in Scotland or Ireland.—1715, Severe frost for many weeks.—1739, One for nine weeks; begun Dec. 14.—1742, Severe frost for many weeks.—1747, Severe frost in Russia.—1754, Severe one in England.—1760, The same in Germany.—1776, The same in England.—1788, The Thames frozen below London bridge; and booths erected on it.—1795, The Zuyder Zee frozen over, and the rivers of Holland passed by the French.

CHAP. LII.

CURIOSITIES RESPECTING RUINS.

Ruin at Siwa, in Egypt—Ruins of Palmyra—Ruins of Herculaneum, and Pompeii—Ancient Ruins of Balbec—Ruins of Agrigentum, in Sicily—Ancient Grandeur of Carthage.

The cloud-capt towers, the gorgeous palaces,
The solemn temples, the great globe itself,
Yea, all which it inherit, shall dissolve. *Shakspeare.*

RUIN AT SIWA, IN EGYPT.—A great curiosity about Siwa, is a ruin, of undoubted antiquity, which, according to Mr. Browne, resembles exactly those of Upper Egypt, and was erected and adorned by the same intelligent race of men. The figures of Isis and Anubis are conspicuous among the sculptures; and the proportions are those of the Egyptian temples, though in miniature. What remains of it, is a single apartment, built of massy stones, of the same kind as those

of which the pyramids consist. The length is thirty-two feet, the height eighteen, the width fifteen. A gate at one end forms the principal entrance; and two doors open opposite to each other. The other end is quite ruinous. In the interior are three rows of emblematical figures, representing a procession; and the space between them is filled with hieroglyphic characters. It has been supposed, with some degree of probability, that Siwa is the Siropum of Pliny, and that this building was coeval with the famous temple of Jupiter Ammon, and a dependency on it.

RUINS OF PALMYRA.—These celebrated ruins consist of temples, palaces, and porticos, of Grecian architecture; and lie scattered over an extent of several miles. They were accidentally discovered by some English travellers from Aleppo, above a century ago. The most remarkable of them is the temple of the sun, of which the ruins are spread over a square of 220 yards. It was encompassed with a stately wall, built of large square stones, and adorned with pilasters within and without, to the number of sixty-two on a side. Within the court are the remains of two rows of noble marble pillars, thirty-seven feet high, with their capitals, of most exquisite workmanship. Of these, only fifty-eight remain entire, but they appear to have gone round the whole court, and to have supported a double piazza. The walks opposite the castle appear to have been spacious. At each end of this line are two niches for statues, with their pedestals, borders, supporters, and canopies, carved with the utmost propriety and elegance. The space within this inclosure seems to have been an open court, in the middle of which stood the temple, encompassed with another row of pillars of a different order, and much taller, being fifty feet high; but of these, sixteen only remain. The whole space contained within these pillars is fifty-nine yards in length, and near twenty-eight in breadth.

The temple is thirty-three yards long, and thirteen or fourteen broad. It points north and south; and exactly in the middle of the building on the west side, is a most magnificent entry, on the remains of which are some vines and clusters of grapes, carved in the most masterly imitation of nature that can be conceived. Just over the door are discerned a pair of wings, which extend its whole breadth; but the body, whether of an eagle or an angel, is destroyed. The north end of this temple is adorned with the most curious fret-work in bas-relief; and in the middle is a dome, or cupola, about ten feet diameter.

North of this place is an obelisk, consisting of seven large stones, besides its capital. It is about fifty feet high, and

just above the pedestal is twelve feet in circumference. About a quarter of a mile from this pillar, to the east and west, are two others, besides the fragment of a third. About 100 paces from the middle obelisk, is a magnificent entry to a piazza, which is forty feet broad, and more than half a mile long, inclosed with two rows of marble pillars twenty-six feet high, and eight or nine in compass. Of these there still remain 129, but there must originally have been no less than 560. The upper end of the piazza was closed by a row of pillars.

To the left are the ruins of a stately banqueting-house, built of better marble, and finished with yet greater elegance, than the piazza. The pillars which supported it were of one entire stone. It measures twenty-two feet in length, and in compass eight feet nine inches.

In the west side of the piazza are several apertures for gates into the court of the palace. Each of these were adorned with four porphyry pillars, placed by couples in the front of the gate facing the palace, two on each side. Two of these only remain entire. They are thirty feet long, and nine in circumference. On the east side of the piazza stands a great number of marble pillars, some perfect, but the greater part mutilated.

At a little distance are the remains of a small temple, without a roof. Before the entry, which looks to the south, is a piazza supported by six pillars, two on each side of the door, and one at each end. The pedestals of those in front have been filled with inscriptions, both in the Greek and Palmyrene languages, which are become totally illegible.

Among these ruins are many sepulchres. They are all square towers, four or five stories high. There is a walk across the whole building; the space on each hand is subdivided into six partitions by thick walls. The space between the partitions is wide enough to receive the largest corpse; and in these niches there are six or seven piled one upon another. Many inscriptions have been found at Palmyra, which have occupied much of the attention of the learned.

RUINS OF HERCULANEUM AND POMPEII,—two ancient cities of Campania in Italy, which were destroyed by an eruption of Vesuvius, in the first year of the emperor Titus, or the 79th of the Christian æra, and lately rendered famous on account of the curious monuments of antiquity discovered in their ruins; an account of which has been published by order of the king of Naples, in a work of six volumes folio. The epocha of the foundation of Herculaneum is unknown. Dionysius of Halicarnassus conjectures that it may be referred to sixty years before the war of Troy, or about 1342 B. C.; and there-

fore that it lasted about 1400 years. The thickness of the heaps of lava, by which the city was overwhelmed, has been much increased by fiery streams vomited since that catastrophe, and now forms a mass twenty-four feet deep, of dark grey stone, which is easily broken in pieces. By its non-adhesion to foreign bodies, marbles and bronzes are preserved in it as in a case made to fit them, and exact moulds of the faces and limbs of statues are frequently found in this substance.

The precise situation of this subterraneous city was not known till 1713, when it was accidentally discovered by some labourers, who, in digging a well, struck upon a statue on the benches of the theatre. Many others were afterwards dug out, and sent to France by the prince of Elbœuf. But little progress was made in the excavations, till Charles, infant of Spain, ascended the Neapolitan throne, by whose unwearied efforts and liberality a very considerable part of *Herculaneum* has been explored, and such treasures of antiquity drawn out, as form the most curious museum in the world.

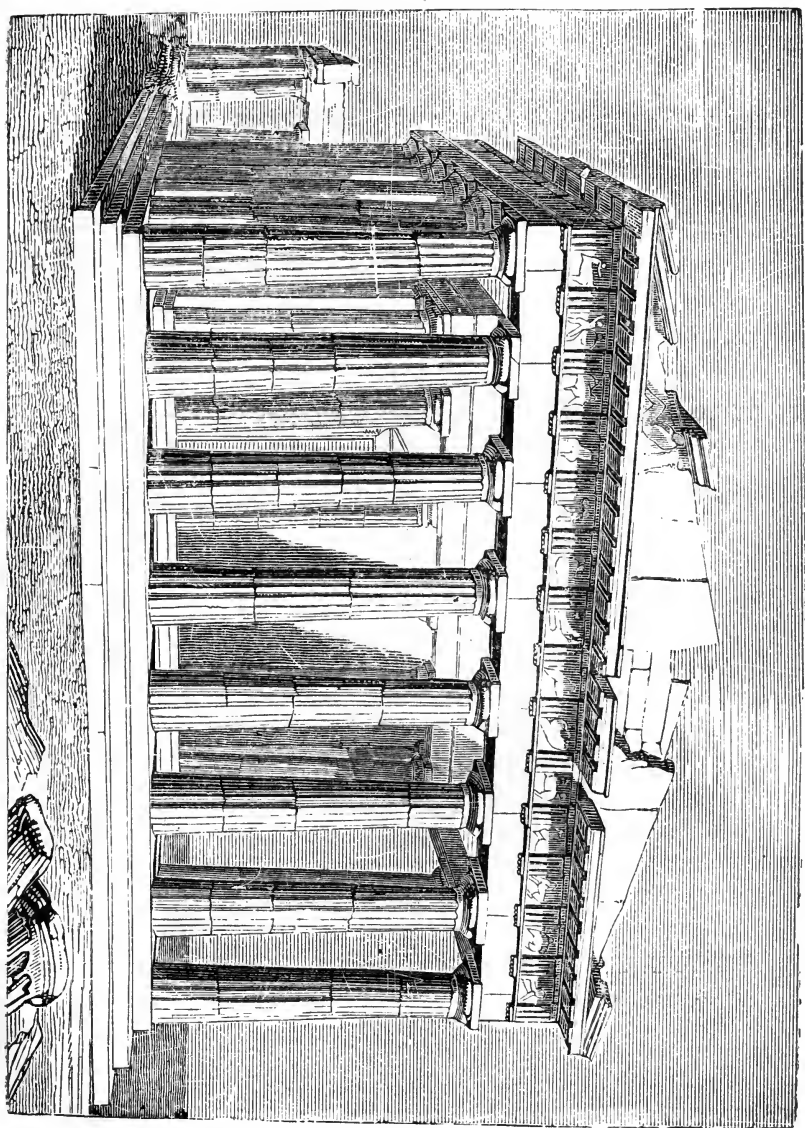
It being too arduous a task to attempt removing the covering, the king contented himself with cutting galleries to the principal buildings, and causing the extent of one or two of them to be cleared. Of these, the theatre is the most considerable. On a balustrade which divided the orchestra from the stage, was found a row of statues; and, on each side of the pulpitum, the equestrian figure of a person of the Nonian family. They are now placed under porticos of the palace; and from the great rarity of equestrian statues in marble, would be very valuable objects, were the workmanship even less excellent than it is: one of them in particular is a very fine piece of sculpture. The collection of curiosities brought out of *Herculaneum* and *Pompeii*, consist not only of statues, busts, altars, inscriptions, and other ornamental appendages of opulence and luxury; but also comprehend an entire assortment of the domestic, musical, and chirurgical instruments used by the ancients; tripods of elegant form and exquisite execution, lamps in endless variety, vases and basons of noble dimensions, chandeliers of the most beautiful shapes, pateras and other appurtenances of sacrifice; looking-glasses of polished metal; coloured glass, so hard, clear, and well stained, as to appear like emeralds, sapphires, and other precious stones; a kitchen completely fitted up with copper pans lined with silver, cisterns for heating water, and every utensil necessary for culinary purposes; specimens of various sorts of combustibles, retaining their form, though burnt to a cinder; corn, bread, fish, oil, wine, and flour; a lady's toilet, fully furnished with combs, thimbles, rings, paint, ear-rings, and other articles

Among the statues, which are numerous, a Mercury and a sleeping fawn are most admired by connoisseurs. The busts fill several rooms; but very few of the originals whom they were meant to imitate are known. The floors are paved with ancient mosaic. Few rare medals have been found in these ruins: the most curious is a gold medallion of Augustus, struck in Sicily, in the fifteenth year of his reign. The fresco paintings, which, for the sake of preservation, have been torn off the walls, and framed and glazed, are to be seen in another part of the palace.

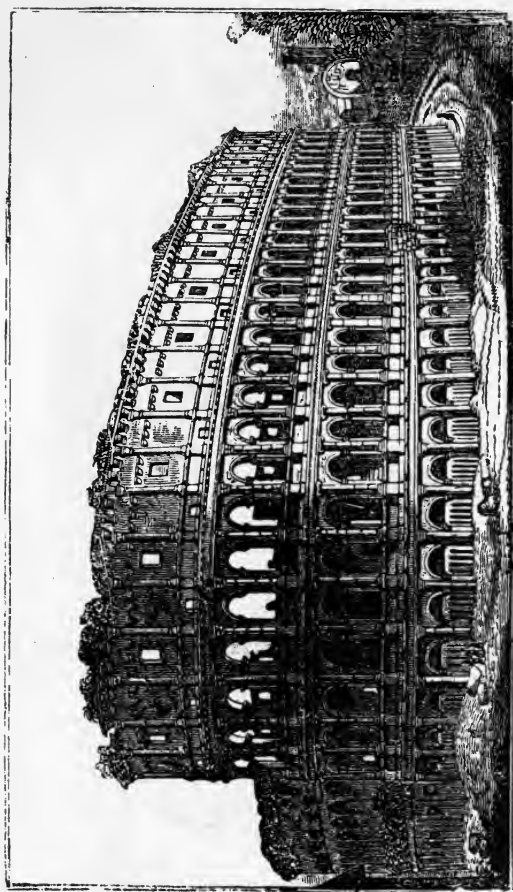
The streets of the city of Pompeii are said to be daily disencumbered. Mr. Williams, a late traveller, informs us, that he entered by the Appian Way through a narrow street of small tombs, beautifully executed, with the names of the deceased, plain and legible. At the gate was a sentry-box, in which the skeleton of a soldier was found, with a lamp in his hand. The streets are lined with public buildings, the painted decorations of which are fresh and entire. There were several tradesmen's shops also discovered—such as, a baker's, an oilman's, an ironmonger's, a wine shop, with money in the till, and a surgeon's house, with chirurgical instruments; also a great theatre, a temple of justice, an amphitheatre 220 feet long, various temples, a barrack for soldiers, (the columns of which are scribbled with their names and jests,) and stocks for prisoners, in one of which a skeleton was likewise discovered. The principal streets are about sixteen feet wide; the subordinate ones from six to ten feet.

THE ANCIENT RUINS OF BALBEC.—To give a just idea of these ruins, we must suppose ourselves descending from the interior of the town. After having crossed the rubbish and huts with which it is filled, we arrive at a vacant place, which appears to have been a square; there, in front, towards the west, we perceive a grand ruin, which consists of two pavilions ornamented with pilasters, joined at their bottom angle by a wall one hundred and sixty feet in length. This front commands the open country from a terrace, on the edge of which we distinguish with difficulty the bases of twelve columns, which formerly extended from one pavilion to the other, and formed a portico. The principal gate is obstructed by heaps of stones; but, that obstacle surmounted, we enter an empty space, which is an hexagonal court of one hundred and eighty feet in diameter. This court is strewn with broken columns, mutilated capitals, and the remains of pilasters, entablatures, and cornices; around it is a row of ruined edifices, which display all the ornaments of the richest architecture.

At the end of this court, opposite the west, is an outlet,



THE PARTHENON. AT ATHENS.



AMPHITHEATRE OF VESPASIAN.

which formerly was a gate, through which we perceive a still more extensive range of ruins, whose magnificence strongly excites curiosity. To have a full prospect of these, we must ascend a slope, up which were the steps to this gate; and we then arrive at the entrance of a square court, much more spacious than the former, being three hundred and fifty feet wide, and three hundred and thirty-six in length. The eye is first attracted by the end of this court, where six enormous and majestic columns render the scene astonishingly grand and picturesque. Another object, not less interesting, is a second range of columns to the left, which appear to have been part of the peristyle of a temple; but before we pass thither, we cannot refuse particular attention to the edifices which inclose this court on each side. They form a sort of gallery, which contains various chambers, seven of which may be reckoned in each of the principal wings, viz. two in a semicircle, and five in an oblong square. The bottom of these apartments still retains pediments of niches and tabernacles, the supporters of which are destroyed. On the side of the court they are open, and present only five or six columns totally destroyed. The beauty of the pilasters, and the richness of the frieze of the entablature, are admirable. The singular effect which results from the mixture of the garlands, the large foliage of the capitals, and the sculpture of wild plants with which they are every where ornamented, is peculiarly pleasing. In traversing the length of the court, we find in the middle a little square esplanade, where was a pavilion, of which nothing remains but the foundation. On arriving at the foot of the six columns, we perceive all the boldness of their elevation, and the richness of their workmanship. Their shafts are twenty-one feet eight inches in circumference, and fifty-eight high; so that the total height, including the entablature, is from seventy-one to seventy-two feet.

The sight of this superb ruin, thus solitary and unaccompanied, at first strikes us with astonishment; but, on a more attentive examination, we discover a series of foundations, which mark an oblong square of two hundred and sixty-eight feet in length, and one hundred and forty-six wide, and which, it seems probable, was the peristyle of a grand temple, the primary purpose of the whole structure. It presented to the great court, on the east, a front of ten columns, with nineteen on each side, which, with the other six, made in all fifty-four. The ground on which it stood is an oblong square, on a level with this court, but narrower, so that there was only a terrace of twenty-seven feet wide round the colonnade; the esplanade this produces fronts the open country towards the west, by a sloping wall of about thirty feet. This descent, near the city,

becomes less steep, so that the foundation of the pavilion is level with the foot of the hill ; whence it is evident that the whole ground of the courts has been artificially raised.

Such was the former state of this edifice ; but the southern side of the grand temple was afterwards blocked up to build a smaller one, the peristyle and walls of which are still remaining. This temple, situated somewhat lower than the other, presents a side of thirteen columns by eight in front, (in all thirty-four,) which are likewise of the Corinthian order : their shafts are fifteen feet eight inches in circumference, and forty-four in height. The building they surround is an oblong square, the front of which, turned towards the east, is out of the line of the left wing of the great court. To reach it, we must cross trunks of columns, heaps of stone, and a ruinous wall, by which it is now hid. After surmounting these obstacles, we arrive at the gate, where we may survey the inclosure, which was once the habitation of a god ; but instead of the solemn scene of a prostrate people, and sacrifices offered by a multitude of priests, the sky, which is open, from the falling in of the roof, only lets in light to shew a chaos of ruins covered with dust and weeds. The walls, formerly enriched with all the ornaments of the Corinthian order, now present nothing but pediments of niches and tabernacles, of which almost all the supporters are fallen to the ground. Between these niches is a range of fluted pilasters, whose capitals support a broken entablature ; but what remains of it displays a rich frieze of foliage, resting on the heads of satyrs, horses, bulls, &c. Over this entablature was the ancient roof, which was fifty-seven feet wide, and one hundred and ten in length. The walls which supported it are thirty-one feet high, and without a window. It is impossible to form any idea of the ornaments of this roof, except from the fragments lying on the ground ; but it could not have been richer than the gallery of the peristyle : the principal remaining parts contain tablets in the form of tables, on which are represented Jupiter seated on his eagle, Leda caressed by the swan, Diana with her bow and crescent, and several busts which seem to be figures of emperors and empresses.

RUINS OF AGRIGENTUM, IN SICILY.—The present town, Girgenti, occupies the mountain on which the ancient citadel stood. At the north-east angle of the ancient limits, upon some foundations of large irregular stones, a church has been erected ; a road appears hewn in the solid rock, for the convenience of votaries, who visited this temple in ancient days. It was then dedicated to Ceres and her daughter Proserpine, the peculiar patronesses of Sicily. Bishop Blaise has succeeded to their honours.

At the south-east corner, where the ground, rising gradually, ends in a bold eminence, which is crowned with majestic columns, are the ruins of a temple, said to have been consecrated to Juno. To the west of this, stands the building commonly called the Temple of Concord; the stone of which, and the other buildings, is the same as that of the neighbouring mountains and cliffs, a conglutination of sea-sand and shells, full of perforations,—of a hard and durable texture, and a deep reddish brown colour. This Doric temple has all its columns, entablature, pediments, and walls, entire; only part of the roof is wanting. It owes its preservation to the piety of some Christians, who have covered half the nave, and converted it into a church, consecrated under the invocation of St. Gregory, bishop of Girgenti.

In the same direction are rows of sepulchres cut in the rock. Some masses of it are hewn into the shape of coffins; others are drilled full of small square holes, employed in a different mode of interment, and serving as receptacles of urns. One ponderous piece of it lies in an extraordinary position; by the failure of its foundation, or the shock of an earthquake, it has been loosened from the general quarry, and rolled down the declivity, where it now remains supine, with the cavities turned upwards.

Only a single column marks the confused heap of moss-grown ruins belonging to the temple of Hercules. It stood on a projecting rock above a chasm in the ridge, which was cut through for a passage to the port.

In the same tract, over some hills, is situated the Tomb of Thero. It is surrounded by aged olive-trees, which cast a wild irregular shade over the ruin. The edifice inclines to the pyramidal shape, and consists at present of a triple plinth, and a base supporting a square pedestal: upon this plain solid foundation is raised a second order, having a window in each front, and at each angle two Ionic pilasters, crowned with an entablature of the Doric order. Its inside is divided into a vault, a ground room, and one in the Ionic story, communicating with each other by means of a small internal staircase.

In the plain are seen the fragments of the temple of *Æsculapius*: part of two columns and two pilasters, with an intermediate wall, support the end of a farm-house, and were probably the front of the cells.

Towards the west are the gigantic remains of the temple of Jupiter Olympus, minutely described by Diodorus Siculus. It may literally be said, that it has not one stone left upon another; and it is barely possible, with the help of much conjecture, to discover the traces of its plan and dimensions. Diodorus calls it the largest temple in the whole island;

but adds, that the calamities of war caused the work to be abandoned before the roof could be put on; and that the Agrigentines were ever after reduced to such a state of poverty and dependence, that they never had it in their power to finish this superb monument of the taste and opulence of their ancestors. The length of this temple was 370 Greek feet, its breadth 60, and its height 220, exclusive of the foundation; the extent and solidity of its vaults and underworks, its spacious porticos and exquisite sculpture, were suited to the grandeur of the whole.

The next ruin belongs to the temple of Castor and Pollux: vegetation has covered the lower parts of the building, and only a few fragments of columns appear between the vines. This was the point of the hill where the wall stopped on the brink of a large fishpond, spoken of by Diodorus: it was cut in the solid rock thirty feet deep, and water was conveyed to it from the hills. In it was bred a great quantity of fish, for the use of public entertainments; swans, and various other kinds of wild fowl, swam along its surface, for the amusement of the citizens; and the great depth of water prevented an enemy from surprising the town on that side. It is now dry, and used as a garden.

On the opposite bank are two tapering columns without their capitals, placed in a tuft of carob trees. Monte Toro, where Hanna encamped with the Carthaginian army, before the Roman consuls drew him into an engagement that ruined his defensive plan, is a noble back-ground in this picturesque group of objects.

The whole space, comprehended within the walls of the ancient city, abounds with traces of antiquity, foundations, brick arches, and little channels for the conveyance of water; but in no part are there any ruins that can be presumed to have belonged to places of public entertainment. This is the more extraordinary, as the Agrigentines were fond of shows and dramatic performances; and the Romans never dwelt in any place long, without introducing their savage games.

We conclude this division of Curiosities by a description of the ANCIENT GRANDEUR OF CARTHAGE.—At the third Punic war, Carthage appears to have been one of the first cities in the world. It was no less than 360 stadia, or forty-five miles, in circumference, and was joined to the continent by an isthmus, twenty-three stadia, or three miles and a furlong, in breadth. On the west side projected a long tract of land, half a stadium broad; which shooting out into the sea, separated it from a lake, or morass, and was strongly fortified on all sides by rocks and a single wall. In the middle of the city stood the citadel of Byrsa, having on the top of it a

temple sacred to Æsculapius, seated upon rocks, to which the ascent was by sixty steps. On the south side the city was surrounded by a triple wall, thirty cubits high; flanked all round by parapets and towers, at equal distances of 480 feet. Every tower had its foundation sunk thirty-two feet deep, and was four stories high, though the walls were but two: they were arched; and in the lower part, corresponding in depth with the foundations above-mentioned, were stalls, large enough to hold 300 elephants, with their fodder, &c. Over these were stalls and other conveniences for 4000 horses; and there was likewise room for lodging 20,000 foot and 4000 cavalry, without incommoding the inhabitants. There were two harbours, which had one common entrance, seventy feet broad, and shut up with chains. The first was appropriated to the merchants, and included in it a vast number of places of refreshment, and all kinds of accommodations for seamen. The second, as well as the island of Cothon in the midst of it, was lined with large quays, in which were receptacles for sheltering 220 ships of war. Over these were magazines of all sorts of naval stores. The entrance into each of these receptacles was adorned with two marble pillars of the Ionic order, so that both the harbour and island represented on each side two magnificent galleries. Near this island was a temple of Apollo, in which was a statue of the god, of massy gold; and the inside of the temple was lined with plates of the same metal, weighing 1000 talents. The city was twenty-three miles in circumference, and contained 700,000 inhabitants.

“All that remains, (says Dr. Shaw,) of this once famous city, are,—the area of a spacious room upon one of the hills on which it stood, commanding the south-east shore, with several smaller ones at a little distance from it; the common sewers, which time has not in the least injured or impaired; and the cisterns, which have shared only in a small degree the general ruin of the city

CHAP. LIII.

CURIOSITIES RESPECTING ANCIENT BUILDINGS, TEMPLES, & OTHER MONUMENTS OF ANTIQUITY.

EGYPTIAN CURIOSITIES:—*Pompey's Pillar—Buildings, and Library, of Alexandria—Temple of Tentyra—Palace of Memnon—Temple of Osiris.*

If glorious structures and immortal deeds
 Enlarge the thought, and set our souls on fire;
 My tongue has been too cold in Egypt's praise,
 The queen of nations, and the boast of times,
 Mother of science, and the house of gods!
 Scarce can I open wide my labouring mind,
 To comprehend the vast idea, big
 With arts and arms, so boundless is its fame. *Young.*

PYRAMIDS OF EGYPT—From Cabillia's Researches, as recorded in Belzoni's Narrative.—

"The enterprise of Captain Cabillia was hazardous and bold, and nothing but an enthusiasm for discovery could induce a man to take such a step. The consul, with Mr. Briggs, Mr. Beechey, and myself, went to see the operations that were going on. Captain Cabillia's circumstances were much better than mine; but he had no superfluous wealth at command, to continue what he had begun, which required a supply beyond his means. Mr. Briggs was the first who generously offered to furnish money for this purpose; and, after a consultation with Mr. Salt, they agreed to support the work to any extent that might be required. This gentleman not only encouraged the undertaking at the pyramid, but has exerted his influence with Mohammed Ali, for the general advantage of the commerce of Europe.

"The enterprise of Captain Cabillia is worthy the attention of every one interested in antiquities, as he had solved a question by which the learned world has been puzzled for many centuries. The famous well, which has given rise to so much conjecture, turns out to be a communication with a lower passage, leading into an inferior chamber, discovered and opened by himself. He first descended the well to the depth of thirty-eight feet, where his progress was stopped by four large stones. Three of these being removed, there was space enough for a man to pass through; but the fourth he could not stir, though he had the help of Mr. Kabitsch, a young man in the employment of Mr. Baghos, who bore a share of the expense with the captain. Twenty-one feet below

this place they found a grotto, seventeen feet long and four high; and seven feet below this, a platform, from which the well descended two hundred feet lower. The captain went down, and at the bottom found earth and sand; but from the hollow sound under his feet, he judged that the passage must communicate with some other apartment below. He then set some Arabs at work to remove the sand; but the heat was so great, and the candles so incapable of burning, for want of oxygen, that they were compelled to desist. The captain then turned his researches to another quarter, and began to enlarge the entrance into the first passage of the pyramid. For this operation he was well rewarded; for by it he found that the passage continued downward, and having employed several men, and taken out a great deal of earth and rubbish, at last, after a long and ardent toil, he came in contact with the bottom of the well, where he found the baskets and rope which had been left there. The same day that this occurred, was that on which we had agreed to visit the pyramids, and I had the pleasure to be an eye-witness of the arduous task of Captain Cabillia. Proceeding in his laborious researches, he found that the passage led into a chamber cut out of the rock, under the centre of the pyramid.

“Captain Cabillia made several researches round the pyramids also, but none exceeded his toil in uncovering the temple sphinx. He found a small temple between the two paws, and a large tablet of granite on its breast. The tablet is adorned with several figures and hieroglyphics, and two representations of sphinxes are sculptured on it. Before the entrance into the small temple was a lion, placed as if to guard the approach. Farther on from the front of the sphinx, is a staircase of thirty-two steps, at the bottom of which is an altar, with a Greek inscription, of the time of the Ptolemies. At each side of the altar was a sphinx of calcareous stone, much mutilated. From the base of the temple to the summit of the head, is sixty-five feet; the legs of the sphinx are fifty-seven feet long, from the breast to the extremity of the paws, which are eight feet high. Forty-five feet from the first altar, he found another, with an inscription, alluding to the emperor Septimus Severus; and near to the first step was a stone, with another Greek inscription, alluding to Antoninus.

“Notwithstanding his own occupation about the sphinx, Captain Cabillia employed other people to carry on researches. He opened some of the mausoleums which were choked up with sand, and found several small chambers, with hieroglyphics and figures, some of them pretty well executed, and in good preservation. In one of the pits he found some mummies, in their linen envelopes, and various fragments of Egyptian antiquity. He also opened some of the smaller

pyramids, and from the suggestion of Mr. Briggs to follow a certain direction, he succeeded in finding the entrance into one of them; but it appears, that it was so decayed in the interior, he could advance only a few feet. No doubt this led into some chamber or apartment, containing perhaps a sarcophagus, &c."

Belzoni's own Researches.—M. Belzoni determined on penetrating one of the famous pyramids, and, after an immense labour, succeeded in discovering the entrance, and reached a portcullis; but here a large block of stone stared him in the face, and appeared to say, *Ne plus ultra*. He persevered until the stone was removed and the passage opened, which is only four feet high, and three feet six inches wide. After thirty days' exertion, he reached the central chamber, where he found a sarcophagus. This chamber is forty-six feet three inches long, sixteen feet three inches wide, and twenty-three feet six inches high. It is cut out of the solid rock, from the floor to the roof, which is composed of large blocks of calcareous stone, meeting in the centre, and forming a roof of the same slope as the pyramid itself. The sarcophagus is eight feet long, three feet six inches wide, and two feet three inches deep in the inside. It is surrounded by large blocks of granite, apparently to prevent its removal, which could not be effected without great labour. The lid had been broken at the side, so that the sarcophagus was quite open. It is of the finest granite; but, like the other, in the first pyramid, there is not one hieroglyphic on it.

On the wall, at the west end of the chamber, was an inscription in Arabic, which has been thus translated by Mr. Salame:—

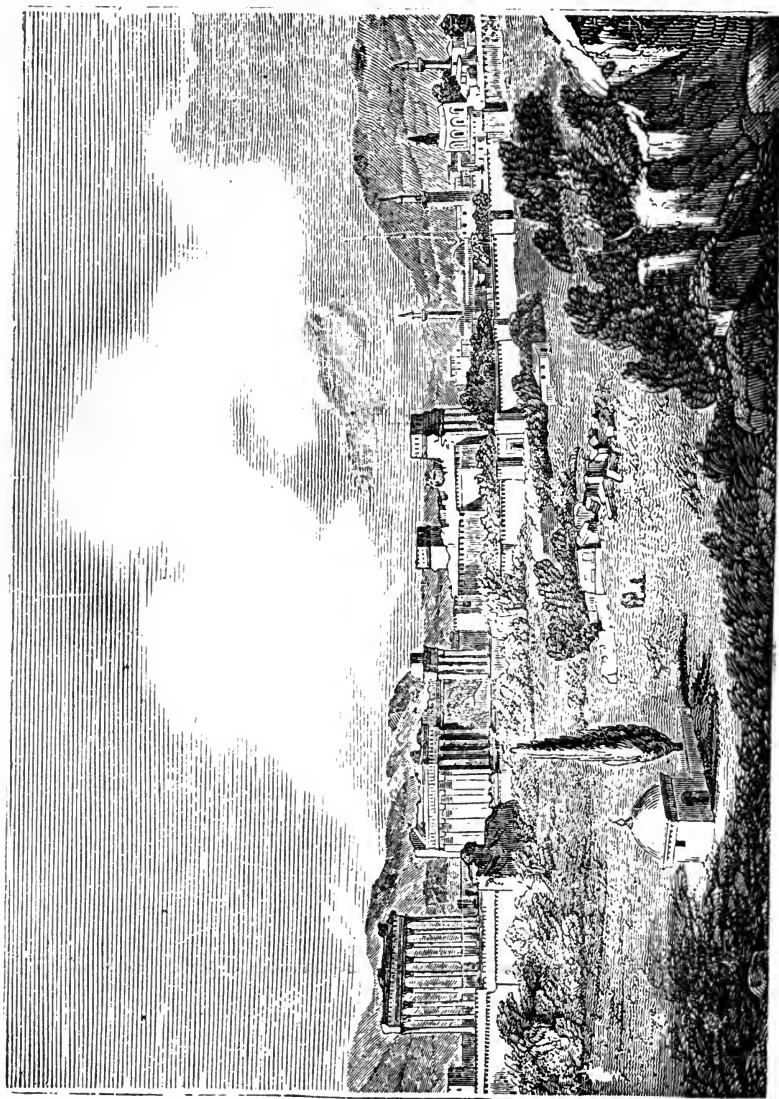
"The master Mohammed Ahmed, lapicide, has opened them; and the master Ottoman attended this (*opening*;) and the King Alij Mohammed at first (*from the beginning*) to the closing up."

M. Belzoni refutes the general assertion, that the pyramids were built of stone brought from the east side of the Nile; since stones of immense size have been cut from the very rocks around the pyramids, and there is yet stone enough to build many others if required. He is of opinion, that the pyramids were erected before writing in hieroglyphics was invented, and that they were erected as sepulchres. By the measurement which he took of the second pyramid, he found it to be as follows:—

	Feet.
The base	684
Apotome, or central line down the front, from the top to the base	568
Perpendicular	456
Coating, from the top to the place where it ends	140

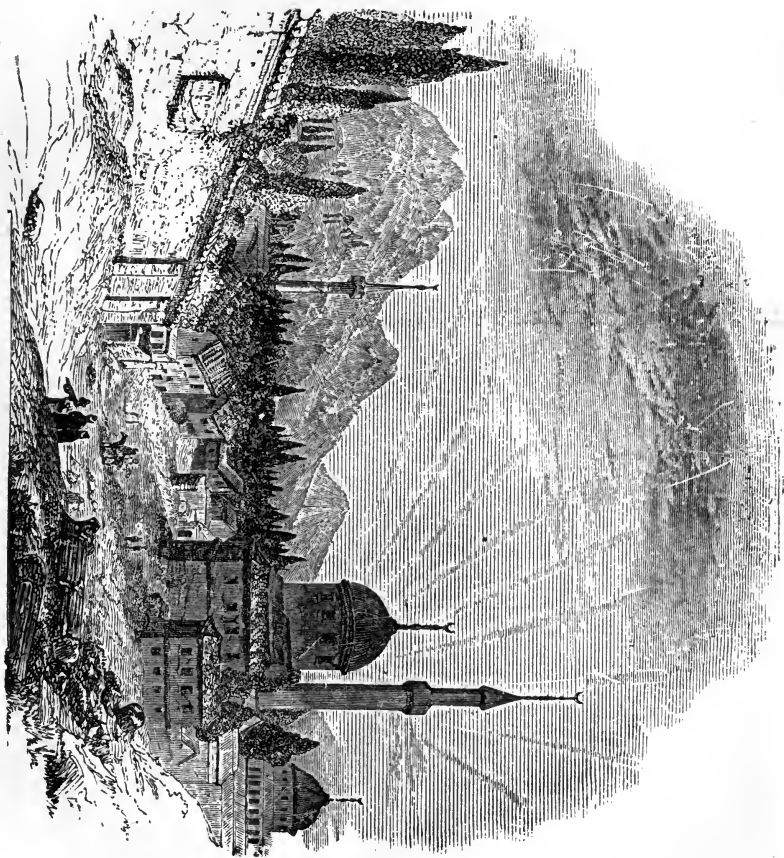
ROMAN WAR CHARIOT.

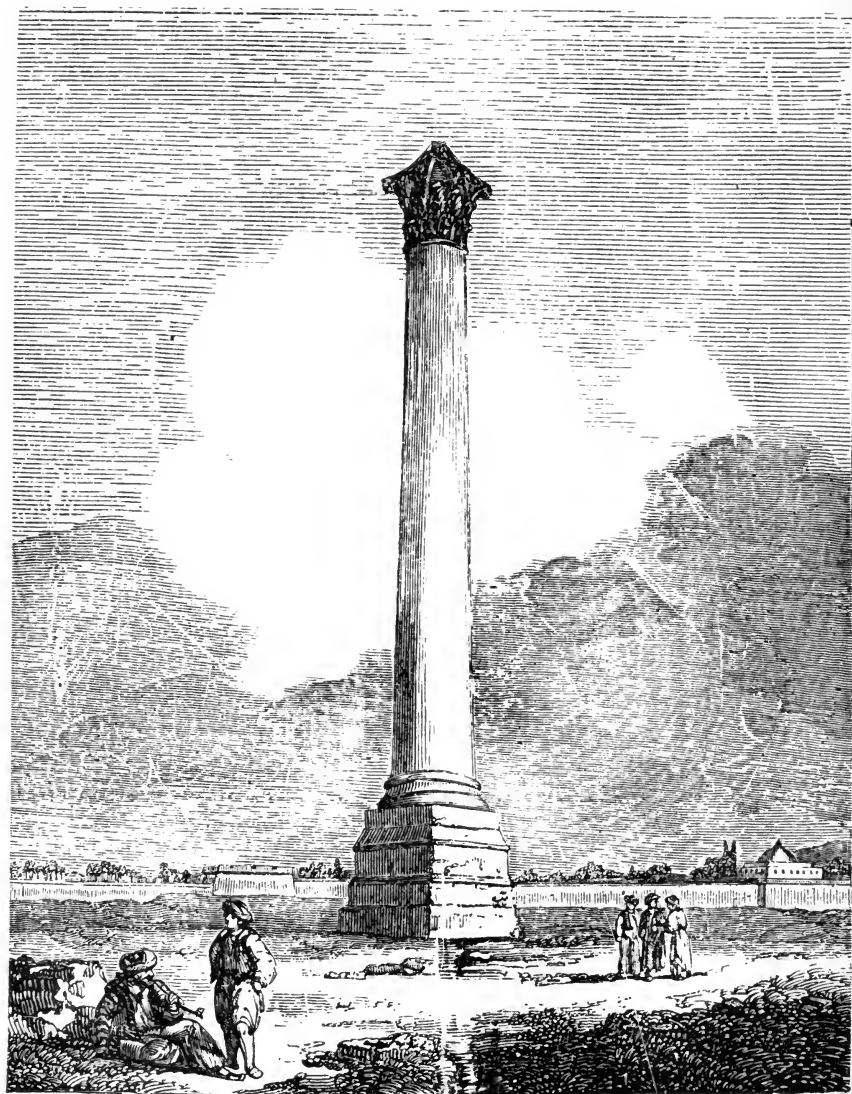




RUINS OF THE ANCIENT CITY OF BAALBEC OR BAALGAD, BUILT BY KING SOLOMON

THEATRA.





POMPEY'S PILLAR

POMPEY'S PILLAR AT ALEXANDRIA; with an account of a surprising Exploit of some British Sailors.

The Pillar.—This pillar is situated a quarter of a league from the southern gate. It is composed of red granite. The capital is Corinthian, with palm leaves, and not indented. It is nine feet high. The shaft and upper member of the base are of one piece of ninety feet long, and nine in diameter. The base is a square of about fifteen feet on each side. This block of marble, sixty feet in circumference, rests on two layers of stone, bound together with lead; which, however, has not prevented the Arabs from forcing out several of them, to search for an imaginary treasure. The whole column is one hundred and fourteen feet high. It is perfectly well polished, and only a little shivered on the eastern side. Nothing can equal the majesty of this monument: seen from a distance, it overtops the town, and serves as a signal for vessels; approaching it nearer, it produces an astonishment mixed with awe. One can never be tired with admiring the beauty of the capital, the length of the shaft, and the extraordinary simplicity of the pedestal. This last has been somewhat damaged by the instruments of travellers, who are curious to possess a relic of this antiquity. Learned men and travellers have made many fruitless attempts to discover, in honour of what prince it was erected. The best informed have concluded that it could not be in honour of Pompey, since neither Strabo nor Diodorus Siculus has spoken of it. The Arabian Abulfeda, in his description of Egypt, calls it the *Pillar of Severus*. And history informs us, that this emperor 'visited the city of Alexandria;' that he granted a senate to its inhabitants, who, until that time, under the subjection of a Roman magistrate, had lived without any national council, as under the reign of the Ptolemies, when the will of the prince was their only law; and that he did not terminate his benefactions here, but changed several laws in their favour. This column, therefore, Mr. Savoy concludes to have been erected by the inhabitants as a mark of their gratitude to Severus; and in a Greek inscription, now half defaced, but visible on the west side when the sun shines upon it, and which probably was legible in the time of Abulfeda, he supposes the name of Severus to have been preserved. He further observes, that this was not the only monument erected to him by the gratitude of the Alexandrians, for there is still seen, in the ruins of Antinœ, built by Adrian, a magnificent pillar, the inscription of which is still remaining, dedicated to Alexander Severus.

The exploit of some British Seamen.—One of the volutes of the column was prematurely brought down some years ago, by a prank of some English captains; which is thus related by Mr. Irwin. These jolly sons of Neptune had been

pushing about the can on board one of the ships in the harbour, until a strange freak entered into one of their brains. The eccentricity of the thought occasioned it immediately to be adopted: and its apparent impossibility was but a spur for the putting it into execution. The boat was ordered; and with proper implements for the attempt, these enterprising heroes pushed ashore, to drink a bowl of punch on the top of Pompey's pillar! At the spot they arrived, and many contrivances were proposed to accomplish the desired point. But their labour was vain; and they began to despair of success, when the genius who struck out the frolic, happily suggested the means of performing it.

A man was dispatched to the city for a paper kite; and the inhabitants, by this time apprised of what was going forward, flocked in crowds to be witnesses of the address and boldness of the English. The governor of Alexandria was told that these seamen were about to pull down Pompey's pillar. But whether he gave them credit for their respect to the Roman warrior, or to the Turkish government, he left them to themselves; and politely answered, that the English were too great patriots to injure the remains of Pompey. He knew little, however, of the disposition of the people who were engaged in this undertaking. Had the Turkish empire risen in opposition, it would not at that moment have deterred them. The kite was brought, and flown directly over the pillar; so that when it fell on the other side, the string lodged upon the capital. The chief obstacle was now overcome. A two-inch rope was tied to one end of the string, and drawn over the pillar by the end to which the kite was affixed. By this rope, one of the seamen ascended to the top; and in less than an hour, a kind of shroud was constructed, by which the whole company went up, and drank their punch, amidst the shouts of the astonished multitude.

To the eye below, the capital of the pillar does not appear capable of holding more than one man upon it; but our seamen found it could contain no less than eight persons very conveniently. It is astonishing that no accident befel these madcaps, in a situation so elevated, that it would have turned a landman giddy in his sober senses. The only detriment which the pillar received, was the loss of the volute before-mentioned, which came down with a thundering sound, and was carried to England by one of the captains, as a present to a lady who had commissioned him to procure her a piece of it. The discovery which they made amply compensated for this mischief; as without their evidence, the world would not have known at this hour, that there was originally a statue on this pillar, one foot and ancle of which are still remaining. The statue must have been of a gigantic size, to have appeared of

a man's proportion at so great a height. There are circumstances in this story which might give it an air of fiction, were it not proved beyond all doubt. Besides the testimonies of many eye-witnesses, the adventurers themselves have left a token of the fact, by the initials of their names, which are very legibly painted in black just beneath the capital

BUILDINGS, AND LIBRARY, OF ALEXANDRIA.—The architect employed by Alexander, in this undertaking, was the celebrated Dinocrates, who had acquired so much reputation by rebuilding the temple of Diana at Ephesus. The city was first rendered populous by Ptolemy Soter, one of Alexander's captains, who, after the death of the Macedonian monarch, being appointed governor of Egypt, soon assumed the title of king, and took up his residence at Alexandria, about three hundred and four years before Christ. In the thirtieth year of his reign he made his son, Ptolemy Philadelphus, partner with him in the empire; and by this prince the city of Alexandria was much embellished. In the first year of his reign, the famous watch-tower of Pharos was finished. It had been begun several years before by Ptolemy Soter; and, when finished, was looked upon as one of the wonders of the world.

The same year, the island of Pharos itself, originally seven furlongs distant from the continent, was joined to it by a causeway. This was the work of Dexiphanes, who completed it at the same time that his son put the last hand to the tower. The tower was a large square structure of white marble, on the top of which, fires were kept constantly burning for the direction of sailors. The building cost 800 talents; which, if Attic, amounted to £165,000; if Alexandrian, to twice that sum. The architect employed in this famous structure, fell upon the following contrivance to usurp the whole glory to himself. Being ordered to engrave upon it the following inscription, "King Ptolemy, to the Gods the Saviours, for the Benefit of Sailors;" instead of the king's name, he substituted his own, and then filling up the marble with mortar, wrote upon it the above-mentioned inscription. In process of time, the mortar being worn off, the following inscription appeared: "Sostratus the Cnidian, the son of Dexiphanes, to the Gods the Saviours, for the Benefit of Sailors"

This year, also, was remarkable for bringing the image of Serapis from Pontus to Alexandria. It was set up in one of the suburbs of the city called Rhacotis, where a temple was afterwards erected to his honour, suitable to the greatness of that stately metropolis, and called, from the god worshipped there, Serapium. This structure, according to Ammianus Marcellinus,

surpassed in beauty the magnificence of all others in the world, except the capitol at Rome.

Within the verge of this temple was the famous Alexandrian library. It was founded by Ptolemy Soter, for the use of an academy he instituted in this city; and, from continual additions by his successors, became at last the finest library in the world, containing no fewer than seven hundred thousand volumes. One method adopted in collecting books for this library, was, to seize all those which were brought into Egypt by the Greeks, or other foreigners. The books were transcribed in the museum by persons appointed for that purpose; the copies were then delivered to the proprietors, and the originals laid up in the library. Ptolemy Euergetes, having borrowed from the Athenians the works of Sophocles, Euripides, and Æschylus, returned them only the copies, which he caused to be transcribed in as beautiful a manner as possible, presenting the Athenians at the same time with 13 talents (upwards of £3000 sterling) for the exchange. As the museum was at first in that quarter of the city called Bruchion, near the royal palace, the library was placed there likewise; but when it came to contain four hundred thousand volumes, another library within the Serapium was erected, by way of supplement to it, and on that account called the Daughter of the former. In this second library, three hundred thousand volumes, in process of time, were deposited; and both libraries together contained the seven hundred thousand volumes already mentioned. In the war carried on by Julius Cæsar against the inhabitants of this city, the library in the Bruchion, with the four hundred thousand volumes it contained, was reduced to ashes. The library in the Serapium, however, still remained; and here Cleopatra deposited two hundred thousand volumes of the Permægean library, with which Marc Antony presented her. These, and others added from time to time, rendered the new library at Alexandria more numerous and considerable than the former; and though it was often plundered during the revolutions and troubles of the Roman Empire, yet it was again and again repaired, and filled with the same number of books.

TEMPLE OF TENTYRA, IN EGYPT.—From Belzoni's Narrative.

"Little could be seen of the temple, till we came near to it, as it is surrounded by high mounds of rubbish of the old Tentyra. On our arriving before it, I was for some time at a loss to know where I should begin my examination; the numerous objects before me, all equally attractive, leaving me for a while in a state of suspense and astonishment. The enormous masses of stone employed in the edifice, are so well

disposed, that the eye discovers the most just proportion every where. The majestic appearance of its construction, the variety of its ornaments, and, above all, the singularity of its preservation, had such an effect on me, that I seated myself on the ground, and, for a considerable time, was lost in admiration. It is the first Egyptian temple the traveller sees on ascending the Nile, and it is certainly the most magnificent. It has an advantage over most others, from the good state of preservation it is in; and I should have no scruple in saying, that it is of a much later date than any other. The superiority of the workmanship gives us sufficient reason to believe it to be of the time of the first Ptolemy; and it is not improbable, that he who laid the foundation of the Alexandrian library, instituted the philosophical society of the museum, and studied to render himself beloved by his people, might erect such an edifice, to convince the Egyptians of his superiority of mind over the ancient kings of Egypt, even in religious devotion.

“This is the cabinet of the Egyptian arts, the product of study for many centuries, and it was here that Denon thought himself in the sanctuary of the arts and sciences. The front is adorned with a beautiful cornice, and a frieze covered with figures and hieroglyphics, over the centre of which the winged globe is predominant, and the two sides are embellished with compartments of sacrifices and offerings. The columns that form the portico are twenty-four in number, divided into four rows, including those in the front. On entering the gate, the scene changes, and requires more minute observation. The quadrangular form of the capitals first strikes the eye. At each side of the square there is a colossal head of the goddess Isis, with cow’s ears. There is not one of these heads but is much mutilated, particularly those on the columns in the front of the temple, facing the outside; but, notwithstanding this disadvantage, and the flatness of their form, there is a simplicity in their countenance that approaches to a smile. The shafts of the columns are covered with hieroglyphics and figures, which are in *basso relievo*, as are all the figures in the front and lateral walls. The front of the door-way, which is in a straight line with the entrance, and the sanctuary, is richly adorned with figures of smaller size than the rest of the portico. The ceiling contains the zodiac, inclosed by two long female figures, which extend from one side to the other of it. The walls are divided into several square compartments, each containing figures representing deities, and priests in the act of offering or immolating victims. On all the walls, columns, ceiling, or architraves, there is nowhere a space of two feet that is not covered with some figures of human beings, animals, plants, emblems of

agriculture, or of religious ceremony. Wherever the eyes turn, wherever the attention is fixed, every thing inspires respect and veneration, heightened by the solitary situation of this temple, which adds to the attraction of these splendid recesses. The inner apartments are much the same as the portico, all covered with figures in *basso relievo*.

"On the top of the temple the Arabs had built a village; I suppose, to be the more elevated, and exposed to the air: but it is all in ruins, as no one now lives there. From the top I descended into some apartments on the east side of the temple; there I saw the famous zodiac on the ceiling. The circular form of this zodiac led me to suppose, in some measure, that this temple was built at a later period than the rest, as nothing like it is seen any where else. In the front of the edifice there is a propylæon, not inferior to the works in the temple, and, though partly fallen, it still shews its ancient grandeur. On the left, going from the portico, there is a small temple, surrounded by columns. In the inside is a figure of Isis sitting with Orus in her lap; and other female figures, each with a child in her arms, are observable. The capitals of the columns are adorned with the figures of Typhon. The gallery, or portico, that surrounds the temple, is filled up with rubbish, to a great height, and walls of unburnt bricks have been raised from one column to another.

"Farther on, in a right line with the propylæon, are the remains of an hypæthral temple, which form a square of twelve columns, connected with each other by a wall, except at the door-way, which fronts the propylæon. The eastern wall of the great temple is richly adorned with figures in *intaglio relevato*; they are perfectly finished; the female figures are about four feet high, disposed in different compartments.

"Behind the temple is a small Egyptian building, quite detached from the large edifice; and, from its construction, I would venture to say, that it was the habitation of the priests. At some distance from the great temple are the foundations of another, not so large as the first. The propylæon is still standing, in good preservation."

Two objects of great curiosity are, THE PALACE OF MEMNON, AND THE TEMPLE OF OSIRIS, AT ABIDOS.—Abidos, an inland town of Egypt, between Ptolemais and Diospolis Parva, towards Cyrene, is famous for the Palace of Memnon, and the Temple of Osiris, and inhabited by a colony of Milesians. It was the only one in the country into which the singers and dancers were forbid to enter. This city, reduced to a village under the empire of Augustus, now presents to

our view only an heap of ruins, without inhabitants; but to the west of these ruins is still found the celebrated Tomb of Ismandes. The entrance is under a portico sixty feet high, and supported by two rows of massy columns. The immovable solidity of the edifice, the huge masses which compose it, the hieroglyphics it is loaded with, stamp it as a work of the ancient Egyptians.

Beyond it, is a temple three hundred feet long, and one hundred and fifty-five wide. Upon entering the monument, we meet with an immense hall, the roof of which is supported by twenty-eight columns, sixty feet high, and nineteen in circumference at the base. They are twelve feet distant from each other. The enormous stones that form the ceiling, perfectly joined and incrustated as it were one into the other, offer to the eye nothing but one solid platform of marble, one hundred and twenty-six feet long, and twenty-six wide. The walls are covered with hieroglyphics. Here are seen a multitude of animals, birds, and human figures with pointed caps on their heads, and a piece of stuff hanging down behind, dressed in loose robes, that come down only to the waist. The sculpture, however, is clumsy; and the forms of the body, with the attitudes and proportions of the members, are ill observed. Amongst these we may distinguish some women suckling their children, and men presenting offerings to them. Here also we meet with the divinities of India.

Monsieur Chevalier, formerly governor of Chandernagore, who resided twenty years in that country, carefully visited this monument on his return from Bengal. He remarked here the gods Juggernaut, Gonez, and Vechnon, or Wistnou, such as they are represented in the temples of Indostan.

A great gate opens at the bottom of the first hall, which leads to an apartment, forty-six feet long by twenty-two wide. Six square pillars support the roof of it, and at the angles are the doors of four other chambers, but so choked up with rubbish that they cannot now be entered. The last hall, sixty-four feet long by twenty-four wide, has stairs which form a descent into the subterraneous apartments of this grand edifice.

The Arabs, in searching after treasure, have piled up heaps of earth and rubbish. In the part we are able to penetrate, sculpture and hieroglyphics are discoverable, as in the upper story. The natives say that they correspond exactly with those above ground, and that the columns are as deep in the earth, as they are lofty above ground. It would be dangerous to go far into those vaults; for the air of them is so loaded with a mephitic vapour, that a candle can scarcely be kept burning in them.

Six lions' heads, placed on the two sides of the temple, serve as spouts to carry off the water. One mounts to the top by a staircase of a very singular structure. It is built with stones incrusting in the wall, and projecting six feet out; so that, being supported only at one end, they appear to be suspended in the air. The walls, the roof, and the columns of this edifice, have suffered nothing from the injuries of time; and did not the hieroglyphics, by being corroded in some places, mark its antiquity, it would appear to have been newly built. The solidity is such, that unless people make a point of destroying it, the building must last a great number of ages. Except the colossal figures, whose heads serve as an ornament to the capitals of the columns, and which are sculptured in *relievo*, the rest of the hieroglyphics which cover the inside are carved in stone.

To the left of this great building we meet with another much smaller, at the bottom of which is a sort of altar. This was probably the sanctuary of the temple of Osiris.

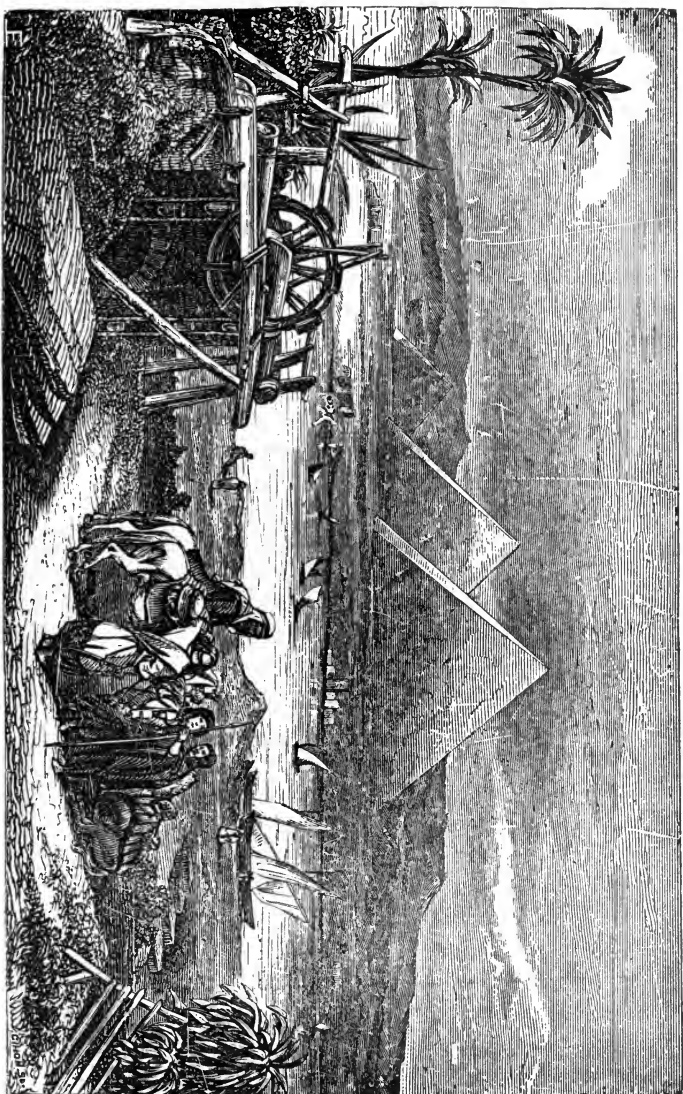


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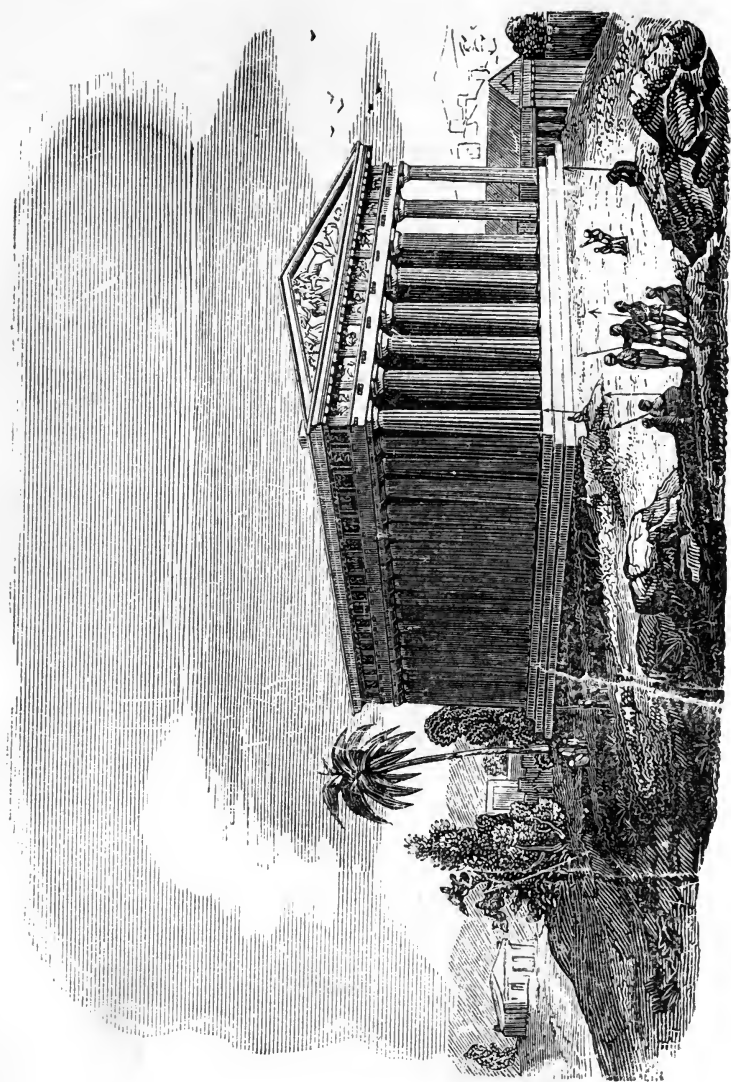
CURIOSITIES RESPECTING BUILDINGS, ETC.—(*Continued.*)

Temple of Diana at Ephesus—Laocoon—Babylon—Alhambra.

TEMPLE OF DIANA, AT EPHEBUS.—The chief ornament of Ephesus was the temple of Diana, built at the common charge of all the states in Asia, and, for its structure, size, and furniture, accounted among the wonders of the world. This great edifice was situated at the foot of a mountain, and at the head of a marsh; which place they chose, if we believe Pliny, as the least subject to earthquakes. This site doubled the charges; for they were obliged to be at a vast expense in making drains to convey the water that came down the hill into the morass and the Cayster. Philo Byzantius tells us, that in this work they used such a quantity of stone, as almost exhausted all the quarries in the country; and these drains, or vaults, are what the present inhabitants take for a labyrinth. To secure the foundations of the conduits or sewers, which were to bear a building of such prodigious weight, they laid beds of charcoal, says Pliny, well rammed, and upon them others of wood: Pliny says, four hundred years were spent in building this wonderful temple, by all Asia: others say, only two hundred and twenty. It was four hundred and twenty-five feet in length, and two hundred in breadth, supported by



PYRAMIDS OF GIZEH. EGYPT



TEMPLE OF TENTYRA IN EGYPT.

one hundred and twenty-seven marble pillars, seventy feet high, of which twenty-seven were most curiously carved, and the rest polished. These pillars were the works of so many kings, and the bas-reliefs of one were done by Scopas, the most famous sculptor of antiquity; the altar was almost wholly the work of Praxiteles. Cheiromocrates, who built the city of Alexandria, and offered to form Mount Athos into a statue of Alexandria, was the architect employed on this occasion.

The temple enjoyed the privilege of an asylum, which at first extended to a furlong, was afterwards enlarged by Mithridates to a bow-shot, and doubled by Marc Antony, so that it took in part of the city: but Tiberius, to put a stop to the many abuses and disorders that attended privileges of this kind, revoked them all, and declared that no man, guilty of any wicked or dishonest action, should escape justice, though he fled to the altar itself.

The priests who officiated in this temple were held in great esteem, and entrusted with the care of sacred virgins, or priestesses, but not till they were made eunuchs. They were called *Estiatores* and *Essenæ*, had a particular diet, and were not allowed to go into any private house. They were maintained out of the profits accruing from the lake Selinusius, and another that fell into it; which must have been very considerable, since they erected a golden statue to one Artemidorus, who being sent to Rome, recovered them, after they had been seized by the farmers of the public revenues.

All the Ionians resorted yearly to Ephesus, with their wives and children, where they solemnized the festival of Diana with great pomp and magnificence, making on that occasion rich offerings to the goddess, and valuable presents to her priests.

The *Asiarchæ*, mentioned by St. Luke, (Acts xix. 31.) were, according to Beza, priests who regulated the public sports annually performed at Ephesus, in honour of Diana; and were maintained with the collections during the sports, for all Asia flocked to see them.

The great Diana of the Ephesians, as she was styled by her blind adorers, was, according to Pliny, a small statue of ebony, made by one Canitia, though believed by the superstitious to have been sent down from heaven by Jupiter. This statue was first placed in a niche, which, we are told, the Amazons caused to be made in the trunk of an elm. Such was the first rise of the veneration that was paid to Diana in this place. In process of time the veneration for the goddess daily increasing among the inhabitants of Asia, a most stately and magnificent temple was built near the place where the elm stood, and the statue of the goddess placed in it. This was the first temple, and was not quite so sumptuous as the

second, though reckoned, as well as it, one of the wonders of the world.

The second temple of the great Diana, was remaining in the times of Pliny and Strabo; and is supposed to have been destroyed in the reign of Constantine, pursuant to the edict of that emperor, commanding all the temples of the heathens to be demolished:—the former was burnt the same day that Alexander was born, by one Erostratus, who owned on the rack, that the only thing which had prompted him to destroy so excellent a work, was the desire of transmitting his name to future ages. Whereupon the common council of Asia made a decree, forbidding any one to name him; but this prohibition served only to make his name the more memorable, such a remarkable extravagance, or rather madness, being taken notice of by all the historians who have written of those times. Alexander offered to rebuild the temple at his own expense, provided the Ephesians would agree to put his name on the front; but they received his offer in such a manner as prevented the resentment of that vain prince, telling him, “it was not fit that one god should build a temple to another.” The pillars, and other materials, that had been saved out of the flames, were sold, with the jewels of the Ephesian women, who on that occasion willingly parted with them; and the sum thus raised served for the carrying on of the work till other contributions came in, which, in a short time, amounted to an immense treasure. This is the temple which Strabo, Pliny, and other Roman writers, speak of. It stood between the city and the port, and was built, or rather finished, as Livy tells us, in the reign of king Servius. Of this wonderful structure there is nothing at present remaining but some ruins, and a few broken pillars, forty feet long, and seven in diameter.

Another curious monument of antiquity, which demands the reader's attention, is, LAOCOON.—This is a celebrated monument of Greek sculpture, exhibited in marble, by Polydorus, Athenodorus, and Agesander, the three famous artists of Rhodes. This relic of antiquity was found at Rome, among the ruins of the palace of Titus, in the beginning of the sixteenth century, under the pontificate of Julius II. and since deposited in the Farnese palace. Laocoon is represented with his two sons, with two hideous serpents clinging round his body, gnawing it, and injecting their poison. Virgil has given us a beautiful description of the fact, *Æn.* lib. ii. 201—222.

This statue exhibits the most astonishing dignity and tranquillity of mind, in the midst of the most excruciating torments. Pliny says of it, that it is, *opus omnibus pictura et statuaria*

artis præferendum.—Lib. xxxvi. c. 5. "The Laocoon (Dr. Giles observes) may be regarded as the triumph of Grecian sculpture; since bodily pain, the grossest and most ungovernable of all our passions, and that pain united with anguish and torture of mind, are yet expressed with such propriety and dignity, as afford lessons of fortitude superior to any taught in the schools of philosophy. The horrible shriek which Virgil's Laocoon emits, is a proper circumstance for poetry; but the expression of this shriek would have totally degraded the statue. It is softened, therefore, into a patient sigh, with eyes turned to heaven in search of relief. The intolerable agony of suffering nature is represented in the lower part, and particularly the extremity of the body; but the manly breast struggles against calamity. The contention is still more plainly perceived in his furrowed forehead; and his languishing paternal eye demands assistance, less for himself than for his miserable children, who look up to him for help."—*Hist. of Greece*, ii. 177.

The Laocoon was sent to Paris by Bonaparte, in 1797.

BABYLON.—The following account of this city, in its greatest splendour, is borrowed principally from Herodotus, who had been on the spot, and is the oldest author who has treated of the subject.

The city of Babylon was square, being a hundred and twenty furlongs, that is, fifteen miles, or five leagues, every way; and the whole circuit of it was four hundred and eighty furlongs, or twenty leagues. The walls were built with large bricks, cemented with bitumen, a thick glutinous fluid, which rises out of the earth in the neighbouring country, and which binds stronger than mortar, and becomes harder than brick itself. These walls were eighty-seven feet thick; and three hundred and fifty high. Those who mention them as only fifty cubits high, refer to their condition after Darius, son of Hystaspes, had commanded them to be reduced to that height, to punish a rebellion of the Babylonians.

The city was encompassed with a vast ditch, which was filled with water, and the sides of which were built up with brick-work. The earth which was dug out, was used in making bricks for the walls of the city; so that the depth and width of the ditch may be estimated by the extreme height and thickness of the walls. There were a hundred gates to the city, twenty-five on each of the four sides. These gates, with their posts, &c. were all of brass. Between every two gates were three towers, raised ten feet above the walls, where necessary; for the city being encompassed in several places with marshes, which defended the approach to it, those parts stood in no need of towers.

A street corresponded with each gate; so that there were fifty streets, which cut one another at right angles, and each of which was fifteen miles in length, and one hundred and fifty-one feet in width. Four other streets, which had houses on one side, and the ramparts on the other, encompassed the whole city, and were each of them two hundred feet wide. By the streets crossing each other, the whole city was divided into six hundred and seventy-six squares, each of which was four furlongs and a half on every side, and two miles and a quarter in circuit. The houses of these squares were three or four stories high, and their fronts were embellished; and the inner space was filled with courts and gardens.

The city was divided into two parts by the Euphrates, which ran from north to south. A bridge of admirable structure, about a furlong in length, and sixty feet in width, formed the communication across the river; and at the two extremities of this bridge were two palaces on the east, and the new palace on the west side of the river. The Temple of Belus, which stood near the old palace, occupied one entire square. The city was situated in a vast plain, the soil of which was extremely fat and fruitful.

To people this immense city, Nebuchadnezzar transplanted hither an infinite number of captives, from the many nations that he subdued. It would appear, however, that the whole of it was never inhabited.

The famous Hanging Gardens, which adorned the palace in Babylon, were ranked among the wonders of the world. They contained four hundred feet square, and were composed of several large terraces; and the platform of the highest terrace was equal in height to the walls of Babylon, that is, three hundred and fifty feet. The ascent from terrace to terrace was by steps ten feet wide. The whole mass was supported by large vaults, built upon each other, and strengthened by a wall twenty-two feet thick. The tops of these arches were covered with stones, rushes and bitumen, and plates of lead, to prevent leakage. The depth of earth was so great, that in it the largest trees might take root. Here was every thing that could please the sight; as, large trees, flowers, plants, and shrubs. Upon the highest terrace was a reservoir, supplied with water from the river.

The predictions of the prophets against Babylon, gradually received their accomplishment. Berosus relates, that Cyrus, having taken this city, demolished its walls, lest the inhabitants should revolt. Darius, son of Hystaspes, destroyed the gates, &c. Alexander the Great intended to rebuild it, but was prevented by death from accomplishing his design. Seleucus Nicator built Seleucia on the Tigris, and this city insensibly deprived Babylon of its inhabitants. Strabo as-

sures us, that under Augustus, Babylon was almost forsaken, and that it was no longer any thing more than a great desert. St. Jerome relates, on the testimony of a monk who dwelt at Jerusalem, that in his time, Babylon and its ancient precincts were converted into a great park, in which the kings of Persia were accustomed to hunt.

A German traveller, named Rauwolf, who in 1574 passed through the place where Babylon formerly stood, speaks of its ruins as follows: "The village of Elugo now stands where Babylon of Chaldea was formerly situated. The harbour is distant from it a quarter of a league, and people go on shore to proceed by land to the celebrated city of Bagdad, which is distant a journey of a day and a half eastward, on the Tigris. The soil is so dry and barren, that they cannot till it; and so naked, that I could scarcely believe, that this powerful city, once the most stately and renowned in all the world, and situated in the most fruitful country of Shinar, could ever have stood in this place. My doubts, however, on this point, were removed, by the situation, and by many antiquities of great beauty, which are still to be seen, and particularly by the old bridge over the Euphrates, of which some piles and arches of brick remain, so strong as to excite admiration. The whole front of the village of Elugo is the hill upon which the castle stood; and the ruins of its fortifications, though demolished and uninhabited, are still visible. Behind, and at a small distance beyond, was the tower of Babylon, which is still to be seen, and is half a league in diameter. It is, however, so ruinous, so low, and so full of venomous creatures, which lodge in holes made by them in the rubbish, that no one dares approach nearer to it than within half a league, except during two months in winter, when these animals never leave their holes. In particular, one sort, which the inhabitants of the country call eglo, possesses a very active poison, and is larger than our lizard."

We shall close this chapter with a full description of an ancient fortress called ALHAMBRA.

This place was the residence of the Moorish monarchs of Grenada. It derives its name from the red colour of the materials with which it was originally built, *Alhambra* signifying a red house. It appears to a traveller as huge a heap of ugly buildings as can well be seen, all huddled together, seemingly without the least intention of forming one habitation out of them. The walls are entirely unornamented, consisting chiefly of gravel and pebbles, daubed over with plaster in a very coarse manner: yet this was the palace of the Moorish kings of Grenada, and it is indisputably the most curious place that exists in Spain, perhaps in the world. In many

countries may be seen excellent modern, as well as ancient architecture, both entire and in ruins; but nothing to be met with any where else, can convey an idea of this edifice, except the decorations of an opera, or the tales of the genii.

Passing round the corner of the emperor's palace, one is admitted at a plain unornamented door in a corner. "On my first visit, (says Mr. Swinburne, in his *Travels in Spain*,) I confess I was struck with amazement, as I stepped over the threshold, to find myself on a sudden transported into a species of fairy land. The first place you come to is the court called the *Communa*, or *Delmesucar*, that is, the common baths; an oblong square, with a deep bason of clear water in the middle; two flights of marble steps leading down to the bottom; on each side a parterre of flowers, and a row of orange trees. Round the court runs a peristyle paved with marble; the arches bear upon very slight pillars, in proportions and style different from all the regular orders of architecture. The ceilings and walls are incrustured with fretwork in stucco, so minute and intricate, that the most patient draughtsman would find it difficult to follow it, unless he made himself master of the general plan. This would facilitate the operation exceedingly; for all this work is frequently and regularly repeated at certain distances, and has been executed by means of square moulds applied successively, and the parts joined together with the utmost nicety. In every division are Arabic sentences of different lengths, most of them expressive of the following meanings; 'There is no conqueror but God;' or, 'Obedience and honour to our lord Abouabdoula.' The ceilings are gilt or painted, and time has caused no diminution in the freshness of their colours, though constantly exposed to the air. The lower part of the wall is mosaic, disposed in fantastic knots and festoons. The porches at the end are more like grotto-work than any thing else to which they can be compared. That on the right hand opens into an octagon vault, under the emperor's palace, and forms a perfect whispering gallery, meant to be a communication between the offices of both houses. Opposite to the door of the *Communa* through which you enter, is another leading into the *Quarto de los leones*, or apartment of the lions, which is an oblong court, one hundred feet in length, and fifty in breadth, environed with a colonnade, seven feet broad on the sides, and ten at the end. Two porticos or cabinets, about fifteen feet square, project into the court at the two extremities. The square is covered with coloured tiles; the colonnade, with white marble. The walls are covered, five feet up from the ground, with blue and yellow tiles, disposed chequerwise. Above and below is a border of small escutcheons, enamelled blue and gold, with an Arabic motto on a bend, signifying,

"No conqueror but God." The columns that support the roof and gallery are of white marble, very slender, and fantastically adorned. They are nine feet high, including base and capital, and eight and a half inches diameter. They are very irregularly placed; sometimes singly, at others, in groups of three, but more frequently two together. The width of the horse-shoe arches above them, is four feet two inches for the large ones, and three for the smaller. The ceiling of the portico is finished in a much finer and more complicated manner than that of the Communa, and the stucco laid on the walls with inimitable delicacy; in the ceiling it is so artfully frosted and handled, as to exceed belief. The capitals are of various designs, though each design is repeated several times in the circumference of the court, but not the least attention has been paid to placing them regularly, or opposite to each other. Not the smallest representation of animal life can be discovered amidst the variety of foliage, grotesques, and strange ornaments. About each arch is a large square of arabesques, surrounded with a rim of characters, that are generally quotations from the Koran. Over the pillars is another square of delightful foliage work. Higher up is a wooden rim, or kind of cornice, as much enriched with carving as the stucco that covers the part underneath. Over this projects a roof of red tiles, the only thing that disfigures this beautiful square. This ugly covering is modern, put on by order of Mr. Wall, the late prime minister. In the centre of the court are twelve ill-made lions, muzzled, their fore parts smooth, their hind parts rough; which bear upon their backs an enormous bason, out of which a lesser rises. While the pipes were kept in good order, a great volume of water was thrown up, that, falling down into the basons, passed through the beasts, and issued out of their mouths into a large reservoir, where it communicated by channels with the *jets d'eau* in the apartments. This fountain is of white marble, embellished with many festoons and Arabic distichs, complimenting the monarch and his princess.

"Passing along the colonnade, and keeping on the south side, you come to a circular room, used by the men as a place for drinking coffee and forbets in. A fountain in the middle refreshed the apartment in summer. The form of this hall, the elegance of its cupola, the cheerful distribution of light from above, and the exquisite manner in which the stucco is designed, painted, and finished, exceed all powers of description. Every thing in it inspires the most pleasing voluptuous ideas; yet in this sweet retreat, they say, that Abouabdoula assembled the Abbencarrages, and caused their heads to be struck off into the fountain.

"Continuing your walk round, you are next brought to a

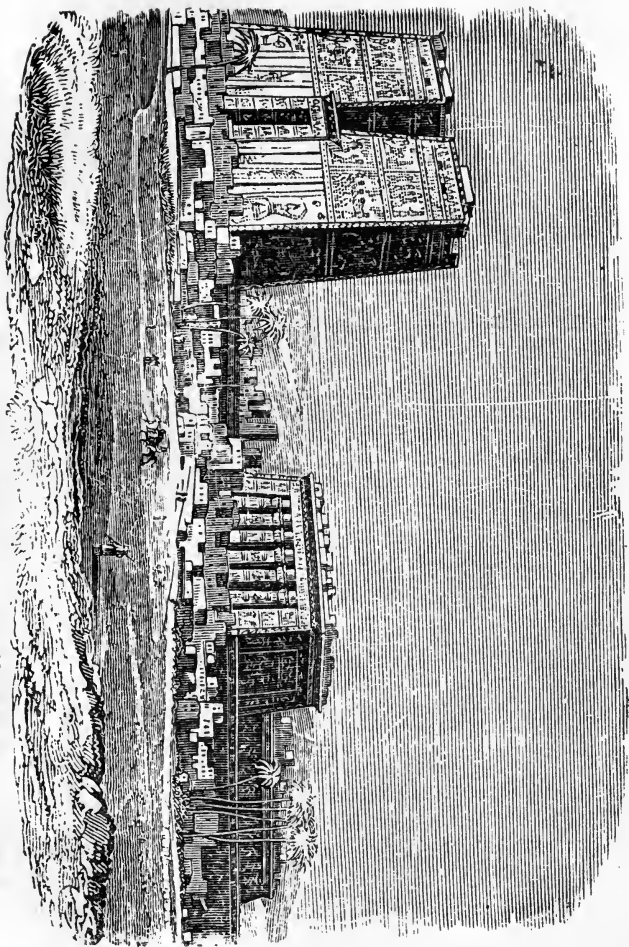
couple of rooms at the head of the court, which are supposed to have been tribunals, or audience chambers.

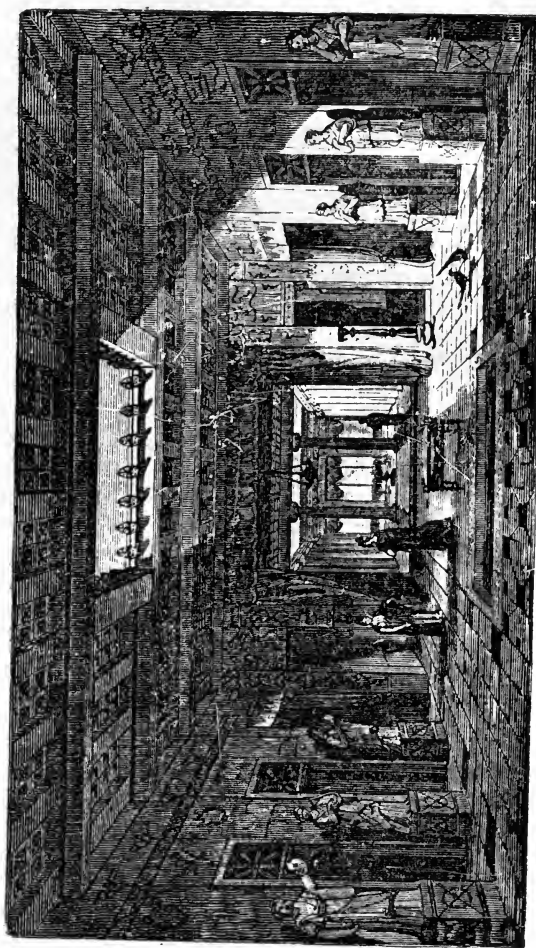
“Opposite to the *Sala de los Abbencarrages*, is the entrance into the *Torre de las dos Hermanas*, or the tower of the Two Sisters; so named from two very beautiful pieces of marble laid as flags in the pavement. This gate exceeds all the rest in profusion of ornaments, and in the beauty of prospect which it affords through a range of apartments, where a multitude of arches terminate in a large window open to the country. In a gleam of sunshine, the variety of tints and lights thrown upon this enfilade, are uncommonly rich. The first hall is the concert-room, where the women sat; the musicians played above in four balconies. In the middle is a *jet d'eau*. The marble pavement is equal to the finest existing, for the size of the flags and evenness of the colour. The two *sisters* are slabs, that measure fifteen feet by seven and a half, without flaw or stain. The walls, up to a certain height, are mosaic, and above are divided into very neat compartments of stucco, all of one design, which is also followed in many of the adjacent halls and galleries. The ceiling is a fretted cove. To preserve this vaulted roof, as well as some of the other principal cupolas, the outward walls of the towers are raised ten feet above the top of the dome, and support another roof over all, by which means no damage can ever be caused by wet weather, or excessive heat and cold.

“From this hall you pass round the little myrtle garden of Lindarax, into an additional building made to the east end by Charles V. The rooms are small and low. His favourite motto, ‘*Plus outré*,’ appears on every beam. This leads to a tower, projecting from the line of the north wall, call El Tocador, or the dressing-room of the sultana. It is a small square cabinet, in the middle of an open gallery, from which it received light by a door and three windows. The view is charming. In one corner is a large marble flag, drilled full of holes, through which the smoke of perfumes ascended from furnaces below; and here, it is presumed, the Moorish queen was wont to sit, to fumigate and sweeten her person. The emperor caused this pretty room to be painted with representations of his wars, and a great variety of grotesques, which appear to be copies, or at least imitations, of those in the lobby of the Vatican.

‘From hence you go through a long passage to the hall of ambassadors, which is magnificently decorated with innumerable varieties of mosaics, and the mottos of all the kings of Grenada. This long narrow antichamber opens into the Comuna on the left hand, and on the right into the great audience hall in the tower of Comares; a noble apartment, thirty-six feet square, thirty-six high up to the cornice, and eighteen

GREAT TEMPLE OF THE ANCIENT EGYPTIANS AT THEBES





INTERIOR OF AN ANCIENT ROMAN HOUSE.

from thence to the centre of the cupola. The walls on three sides are fifteen feet thick, on the other nine; the lower range of windows thirteen feet high. The wall is inlaid with mosaic of many colours, disposed in intricate knots, stars, and other figures. In every part, various Arabic sentences are repeated.

"Having completed the tour of the upper apartments, which are upon a level with the offices of the new palace, you descend to the lower floor, which consisted of bedchambers and summer rooms: the back stairs and passages, that facilitated the intercourse between them, are without number. The most remarkable room below is the king's bedchamber, which communicated, by means of a gallery, with the upper story. The beds were placed in two alcoves, upon a raised pavement of blue and white tiles; but as it was repaired by Philip V. who passed some time here, it cannot be said how it may have been in former times. A fountain played in the middle, to refresh the apartment in hot weather.

"Behind the alcoves are small doors, that conduct you to the royal baths. These consist of one small closet, with marble cisterns for washing children, two rooms for grown-up persons, and vaults for boilers and furnaces, that supplied the baths with water, and the stoves with vapour. The troughs are formed of large slabs of white marble; the walls are ornamented with party-coloured earthenware, and light is admitted by holes in the ceiling. Hard by, is a whispering gallery, and a kind of gallery, said to have been made for the diversion of the women and children. One of the passages of communication is fenced off with a strong iron gate, and called the Prison of the Sultana; but it seems more probable that it was put up to prevent any body from climbing up into the women's quarter.

"Under the council-room is a long slip, called the King's Study: and adjoining to it are several vaults, said to be the place of burial of the royal family. In the year 1574, four sepulchres were opened, but, as they contained nothing but bones and ashes, were immediately closed again."

This description of the Alhambra, concludes by observing how admirably every thing was planned and calculated for rendering this palace the most voluptuous of all retirements: what plentiful supplies of water were brought to refresh it in the hot months of summer; what a free circulation of air was contrived, by the judicious disposition of doors and windows; what shady gardens of aromatic trees; what noble views over the beautiful hills and fertile plains! No wonder the Moors regretted Granada; no wonder they still offer up prayers to God every Friday, for the recovery of this city, which they esteem a terrestrial paradise.

CHAP. LV.

CURIOSITIES RESPECTING TEMPLES, ETC.—(*Continued.*)*Seraglio—Museum—Colossus—and Obelisk.*

SERAGLIO.—THIS word is commonly used to express the house or palace of a prince. In this sense it is frequently used at Constantinople: the houses of foreign ambassadors are called *seraglios*. But it is commonly used, by way of eminence, for the palace of the grand seignior at Constantinople; where he keeps his court,—where his concubines are lodged—and where the youth are trained up for the chief posts of the empire. It is a triangle, about three Italian miles round, wholly within the city, at the end of the promontory Chrysoceras, now called the Seraglio Point. The buildings run back to the bottom of the hill, and thence are gardens that reach to the edge of the sea. It is inclosed with a very high and strong wall, upon which there are several watch-towers; and it has many gates, some of which open towards the sea-side, and the rest into the city: but the chief gate is one of the latter, which is constantly guarded by a company of capooches, or porters; and in the night it is well guarded towards the sea. The outward appearance is not elegant; the architecture being irregular, consisting of separate edifices in the form of pavilions and domes. The ladies of the seraglio are a collection of beautiful young women, chiefly sent as presents from the provinces and Greek islands, and most of them the children of Christian parents. The brave prince Heraclius for some years abolished the infamous tribute of children of both sexes, which Georgia formerly paid every year to the Porte. The number of women in the Harem depends on the taste of the reigning sultan. Selim had two thousand, Achmet had but three hundred, and the late sultan had nearly one thousand six hundred. On their admission, they are committed to the care of the old ladies, taught sewing, embroidery, music, dancing, &c. and furnished with the richest clothes and ornaments. They all sleep in separate beds, and between every fifth there is a preceptress. Their chief governess is called *Katon Kiaga*, or governess of the noble young ladies. There is no servant for they are obliged to wait on one another by rotation; the last that is entered serves her who preceded her, and herself.

These ladies are scarcely ever suffered to go abroad, except when the grand seignior removes from one place to another, when a troop of black eunuchs convey them to the boats,

which are inclosed with lattices and linen curtains, and when they go by land they are put into close chariots, and signals are made at certain distances, to give notice that none approach the roads through which they march. The boats of the Harem, which carry the grand seignior's wives, are manned with twenty-four rowers, and have white covered tilts, shut alternately by Venetian blinds. Among the emperor's attendants are a number of mutes, who act and converse by signs with great quickness, and some dwarfs, who are exhibited for the sultan's amusement.

When he permits the women to walk in the gardens of the seraglio, all people are ordered to retire, and on every side is a guard of black eunuchs, with sabres in their hands, while others go their rounds to hinder any person from seeing them. If any one is found in the garden, even through ignorance or inadvertence, he is instantly killed, and his head brought to the feet of the grand seignior, who rewards the guard for their vigilance.

Sometimes the grand seignior passes into the gardens to amuse himself when the women are there, and it is then they make use of all their utmost efforts, by dancing, singing, seducing gestures, and amorous blandishments, to attract his affections. It is not permitted that the monarch should take a virgin to his bed, except during the solemn festivals, and on occasion of some extraordinary rejoicings, or the arrival of some good news. Upon such occasions, if the sultan chooses a new companion to his bed, he enters into the apartment of the women, who are ranged in files by the governesses, to whom he speaks, and intimates the person he likes best. As soon as the grand seignior has chosen the girl destined to be the partner of his bed, all the others follow her to the bath, washing and perfuming her, and dressing her superbly, and thus conduct her, with singing, dancing, and rejoicing, to the bedchamber of the grand seignior; and if by a certain time she becomes pregnant, and is delivered of a boy, she is called *asaki-sultanness*, that is to say, sultanness-mother. For the first son she has the honour to be crowned, and she has the liberty of forming her court: eunuchs are also assigned for her guard, and for her particular service. No other ladies, though delivered of boys, are either crowned or maintained with such costly distinction at the first; but they have their service apart, and handsome appointments. At the death of the sultan, the mothers of the male children are shut up in the old seraglio, whence they can never come out any more, unless any of their sons ascend the throne.

Baron de Tott informs us, that the female slave who becomes the mother of the sultan, and lives long enough to see her son mount the throne, is the only woman who at that period

acquires the distinction of sultana-mother; she is till then in the interior of her prison with her son. The title *bacht-kadun*, or principal woman, is the first dignity of the grand seignior's Harem; and she has a larger allowance than those who have the title of second, third, and fourth woman, which are the four free women the Koran allows.

It must strike every reader, that the present happy condition of females in Christian countries is directly attributable to Christianity; and this stamps an inestimable value on the gospel. Females should consider it as the charter of their privileges. The Christian religion has, by its letter or spirit, exploded customs and practices which were the immediate causes of female degradation and wretchedness. It has made marriage pure and honourable, by prohibiting polygamy, and restricting within very narrow limits the dangerous liberty of divorce; two customs which violate the plain order and design of Providence in creation, which degrade woman to insignificance and slavery, and which brought on that dissoluteness and corruption of manners in most ancient and some modern nations.

MUSEUM,—is a collection of rare and interesting objects, selected from the whole circle of natural history and the arts, and deposited in apartments or buildings, either by the commendable generosity of rich individuals, general governments, or monarchs, for the inspection of the learned, and the great mass of the public.

The term, which means literally *a study*, or place of retirement, is said to have been given originally to that part of the royal palace at Alexandria, appropriated for the use of learned men, and the reception of the literary works then extant. According to ancient writers, they were formed into classes or colleges, each of which had a competent sum assigned for their support; and we are further informed, that the establishment was founded by Ptolemy Philadelphus, who added a most extensive library.

It would answer little purpose to trace the history of Museums, as the earlier part of it is involved in obscurity; and as we approach our own times, they multiply beyond a possibility of noticing even the most important. Within our brief limits we shall, therefore, confine ourselves to those at the Vatican, Florence, Paris, Oxford, and London.

The Museum of the *Vatican* might originally have been said to occupy all the apartments of the palace, which are more numerous than in any other royal residence in the world: the pictures, the books, the manuscripts, statues, bas-reliefs, and every other description of the labours of ancient artists, were select, uncommon, and valuable in the extreme, particularly

the Laocoon, already described, and said, by Pliny, to have been made from a single mass of marble; which circumstance has since caused a doubt whether that of the Vatican is really the original, as Michael Angelo discovered that it is composed of more than one piece. It was found, in 1506, near the baths of Titus, and, whether an original or a copy, has obtained and deserves every possible admiration.—This invaluable collection continued to increase for several centuries, and till nearly the present period.

The grand dukes of *Tuscany* were for a long series of years ardent admirers of the arts, ancient and modern, and regretted no expense in obtaining the most rare and beautiful objects which vast treasures were capable of procuring; consequently their Museum at Florence vied with that of Rome, and, in some instances, the value of particular articles exceeded any possibility of rivalship: we allude to the Venus de Medicis, of which Keysler speaks thus, in his excellent account of that part of the continent: "I shall conclude this short criticism on the celebrated Venus de Medicis, with the following observation, made by some able connoisseurs, namely, that if the different parts of this famous statue be examined separately, as the head, nose, &c. and compared with the like parts of others, it would not be impossible to find similar parts equal, if not superior, to those of the Venus de Medicis; but if the delicacy of the shape, the attitude, and symmetry of the whole, be considered as an assemblage of beauties, it cannot be paralleled in the whole world. This beautiful statue is placed between two others of the same goddess, both which would be admired by spectators in any other place; but here all their beauties are eclipsed by those of the Venus de Medicis, to which they can be considered only as foils to augment the lustre of that admired statue." Little is known in England of the present state of the Florentine Museum, but it is feared to be deplorable.

We shall now turn our attention to the *Musée Central des Arts*, formed in the Louvre at *Paris*, composed with the best collections on the continent, and consequently consisting of the finest specimens of human art.

The method adopted for arranging the paintings here assembled is judicious, as they are classed in nations, by which means the eye is conducted gradually to the acmè of the art, in the works of the Italian masters.

The gallery of antiquities is directly below the gallery of pictures; and, to give some idea of the nature of the general contents, we shall mention the names of the several divisions, which are: La Salle de Saisons,—La Salle des Hommes illustres,—La Salle des Romains,—La Salle de Laocoon,—La Salle de l'Apollon,—and La Salle des Muses. The Laocoon, which

we have noticed in our account of the Vatican, here received distinguished honours, within a space railed in; and the Apollo Belvidere is equally honoured, in giving name to one of the halls.

These exquisite works are described in a catalogue, which may be obtained in the gallery; and of the manner we shall venture to give a specimen, hoping that a similar method may be adopted, to explain the objects offered to view in our national repository. Under the head 'Pythian Apollo, called the Apollo Belvidere, the author of the catalogue observes, "This statue, the most sublime of those preserved by time, was found, near the close of the fifteenth century, twelve leagues from Rome, at Cape d'Anzo, on the borders of the sea, in the ruins of ancient Antium, a city equally celebrated for its Temple of Fortune, and for its pleasant mansions, erected by successive emperors, which, emulous of each other, they decorated with the most rare and excellent works of art. Julius II. when a cardinal, obtained this statue, and placed it in the palace where he resided, near the church of the Holy Apostles. After his elevation to the pontificate, he had it removed to the Belvidere of the Vatican, where it remained three centuries an object of universal admiration. A hero, conducted by victory, drew it from the Vatican, and causing it to be conveyed to the banks of the Seine, has fixed it here for ever."

Another Museum established at Paris after the return of order, is that of the National Monuments. These were indiscriminately destroyed, or mutilated, during the first frantic emotions of the revolution; and this act contributed not a little to the general dislike it excited: at length the most enlightened part of the National Convention decreed imprisonment in chains to those who should thenceforward injure or destroy the marble and bronze records of their country. Le Noir, a man of taste and learning, seized this opportunity of rescuing the French nation from the reproach it had incurred by destroying what was honourable to themselves; and conceived that, though late, it might still be possible to collect whole monuments in some instances, and fragments in others, sufficient to interest foreigners in favour of his country, or at least to evince to them that a change in sentiment had taken place. Fortunately his plan received public encouragement, and he has, through the assistance of government, procured an astonishing number of specimens from all parts of the kingdom.

Mr. Pinkerton observes of this collection, "It will not escape the attention of the reader of taste, that the arrangement is confused, nay, often capricious, and is capable of great improvement." And Le Maitre says, upon the same

subject, "After several hours employed in this second view, I continue of my former opinion, that the spot (formerly a convent) in which these monuments are collected, is infinitely too small; that the garden, meant to be the tranquil site of sepulchral honours, and the calm retreat of departed grandeur, is on so limited a scale, so surrounded with adjoining houses, and altogether so ill arranged, that instead of presenting the model of

"Those deep solitudes
Where heav'nly pensive contemplation dwells,
And ever musing melancholy reigns ;"

it might easily be mistaken for the working yard of a statuary, or the pleasure ground of a tasteless citizen, decked out with Cupids, Mercuries, and Fawns." Both these authors, however, agree in praising the motives and perseverance of Le Noir.

Oxford has the honour of producing the first, and not the least important Museum in England; which was founded in 1679, and the building completed in 1683, at the expense of the university. The students, the public, and the professors, are indebted to Elias Ashmole, Esq. for an invaluable collection of interesting objects presented by him for their use, and immediately placed within it; since which period it has been called the Ashmolean Museum. The structure, in the Corinthian order of architecture, has a magnificent portal; and the variety and value of the articles contained in it, renders a visit to the apartments highly gratifying, particularly as they are increased from time to time, as often as rare objects can be procured.

The *British Museum*, in London, a repository under the immediate care of government, and itself governed by fifteen trustees, selected from the highest and most honourable offices of the state, promises to exceed every other national institution, which is not supported by the spoliation and plunder of others. However inferior it may appear to those splendid collections, which consist of the most exquisite productions of the chisel and the pencil ever accomplished by man, we have the consolation to reflect, that, had it been possible to procure them by purchase, the liberality of the British nation is such, that Italy and many other countries would have long since been drained; but as the case is, each inhabitant of England may exclaim, with his characteristic integrity, as he views the vast collection which he in common with all his countrymen possesses, "These are individually our own by fair purchase or gift!" Sir Robert Cotton may be said to have laid the foundation of the British Museum, by his presenting his excellent collection of manuscripts to the

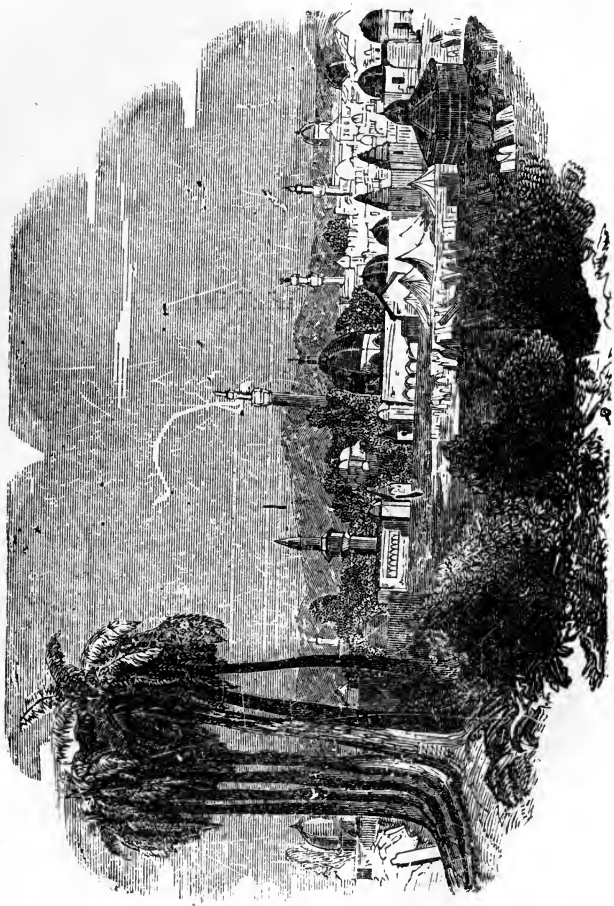
public; those, and the offer of Sir Hans Sloane's books, manuscripts, and curious articles in antiquity and natural history, for £20,000, suggested the propriety of accepting the latter, and providing a place for the reception of both: from this time government proceeded rapidly in forming the plan, and at length every interior regulation for officers, trustees, &c. being made, Montague House, situated in Russell-street, Bloomsbury, was purchased for £10,250, and fitted for the reception of the articles then possessed, and to be bought at the further expense of £14,484. 6s. 4d.: after which Lord Oxford's manuscripts were procured for £10,000, to which the King added others; and since the above period, vast numbers of interesting things have been placed there,—Sir William Hamilton's discoveries, a vast variety of valuable medals, fossils, minerals, manuscripts, and printed books, together with several Egyptian antiquities, and the late Mr. Townsley's marbles and bas-reliefs from Italy. The latter were given to the public under the express condition that a proper place should be built for their reception, which has been complied with, and they are now exhibited, with the rest of the Museum, to an admiring people.

Various alterations have taken place in the regulations adopted for the convenience of those who read at the Museum, and the visitors, since 1757, when it was first opened for inspection and study; and it is but justice to say, each was intended well, though till lately it was thought that too many impediments existed in the way of visiting that which was solely intended for the use of the community: at present, however, no such complaint can be made with truth, as any decently dressed persons, presenting themselves at certain hours, are admitted free of every kind of expense. Admission even to the reading room, is attended with no other difficulty than necessarily follows the ascertaining whether the applicant is deserving of the indulgence, or likely to injure the interests of the institution; when there, every facility is afforded him by commodious tables, with pens and ink for writing, and a messenger in waiting to bring him any books he may think proper to select from the vast stores of literature submitted in this generous way to his use.

Colossus,—is a statue of vast or gigantic size. The most eminent of this kind was the Colossus of Rhodes, a brazen statue of Apollo, one of the wonders of the world. It was the workmanship of Chares, a disciple of Lysippus, who spent twelve years in making it; and was at length overthrown by an earthquake, B. C. 224, after having stood about sixty-six years. Its height was a hundred and five feet; there were few people who could encompass its thumb, which is said to



CHURCH OF NOTRE DAME AT PARIS.



DAMASCUS.

have been a fathom in circumference, and its fingers were larger than most statues. It was hollow, and in its cavities were large stones, employed by the artificer to counterbalance its weight, and render it steady on its pedestal.

On occasion of the damage which the city of Rhodes sustained by the above-mentioned earthquake, the inhabitants sent ambassadors to all the princes and states of Greek origin, in order to solicit assistance for repairing it; and they obtained large sums, particularly from the kings of Egypt, Macedon, Syria, Pontus, and Bithynia, which amounted to a sum five times exceeding the damages which they had suffered. But instead of setting up the Colossus again, for which purpose the greatest part of it was given, they pretended that the oracle of Delphos had forbidden it, and converted the money to other uses. Accordingly, the Colossus lay neglected on the ground for the space of eight hundred and ninety-four years, at the expiration of which period, or about the year of our Lord 653 or 672, Moawyas, the sixth caliph, or emperor of the Saracens, made himself master of Rhodes, and afterwards sold the statue, reduced to fragments, to a Jewish merchant, who loaded nine hundred camels with the metal; so that, allowing eight hundred pounds weight for each load, the brass of the Colossus, after the diminution which it had sustained by rust, and probably by theft, amounted to seven hundred and twenty thousand pounds weight. The basis that supported it was of a triangular figure: its extremities were sustained by sixty pillars of marble. There was a winding staircase to go up to the top of it; where might be discovered Syria, and the ships that went to Egypt, in a great looking-glass that was hung about the neck of the statue.

This enormous statue was not the only one that attracted attention in the city of Rhodes. Pliny reckons one hundred other colossuses, not so large, which rose majestically in its different quarters.

OBELISK,—in architecture, is a truncated, quadrangular, and slender pyramid, raised for the purpose of ornament, and frequently charged either with inscriptions or hieroglyphics. Obelisks appear to be of very great antiquity, and to have been first raised to transmit to posterity precepts of philosophy, which were cut in hieroglyphical characters: afterwards they were used to immortalize the great actions of heroes, and the memory of persons beloved and venerated for having performed eminent services to their country.

The first obelisk mentioned in history was that of Rameses, king of Egypt, in the time of the Trojan war, which was forty cubits high; Phuis, another king of Egypt, raised one of

fifty-five cubits; and Ptolemy Philadelphus, another of eighty eight cubits, in memory of Arsinoë. Augustus erected one at Rome, in the Campus Martius, which served to mark the hours on an horizontal dial, drawn on the pavement. They were called by the Egyptian priests, the Fingers of the Sun, because they were made in Egypt to serve also as stiles or gnomons, to mark the hours on the ground. The Arabs still call them Pharaoh's Needles; whence the Italians call them *Aguglia*, and the French *Aiguilles*.

The famous obelisks called the Devil's Arrows, now reduced to three, the fourth having been taken down in the seventeenth century, stand about half a mile from the town of Boroughbridge, to the south-west, in three fields, separated by a lane, nearly two hundred feet asunder, on elevated ground, sloping every way. Mr. Drake urges many arguments for their Roman antiquity, and plainly proves them to be natural, and brought from Plumpton quarries, about five miles off; or from Tekly, sixteen miles off. The cross in the town, twelve feet high, is of the same kind of stone. The easternmost, or highest, is twenty-two feet and a half high, by four broad, and four and a half in girth; the second, twenty-one and a half by fifty-five and a quarter; the third, sixteen and a half by eighty-four. Stukeley's measures differ. The flutings are cut in the stone, but not through: the tallest stands alone, and leans to the south. Plot and Stukeley affirm them to be British monuments, originally hewn square. Dr. Gale supposed that they were Mercuries, which had lost their heads and inscriptions; but in a manuscript note in his Antoninus, he acknowledges that he was misinformed, and that there was no cavity to receive a bust.

On the north side of Penrith, in the church-yard, are two square obelisks, of a single stone each, eleven or twelve feet high, about twelve inches diameter, and twelve by eight at the sides; the highest about eighteen inches diameter, with something like a transverse piece to each, and mortised into a round base. They are fourteen feet asunder, and between them is a grave, which is inclosed between four semicircular stones, of the unequal lengths of five, six, four and a half, and two feet high, having on the outsides rude carving, and the tops notched. This is called the Giant's Grave, and ascribed to Sir Evan Cæsarius, who is said to have been as tall as one of the columns, and capable of stretching his arms from one to the other; to have destroyed robbers and wild boars in Englewood forest; and to have had an hermitage, called Sir Hugh's Parlour.

A little west of these is a stone called the Giant's Thumb, six feet high, fourteen inches at the base, contracted to ten, which is only a rude cross.

We shall conclude this chapter with a description of a **REMARKABLE OBELISK, NEAR FORRES, IN SCOTLAND.**

About a mile from Forres, on the left-hand side of the road, is a remarkable obelisk, said to be the most stately monument of the Gothic kind in Europe; and supposed to have been erected in memory of the treaty between Malcolm II. and Canute the Great, in 1008. It has been the subject of many able pens; and is thus described by Mr. Cordiner, in a letter to Mr. Pennant: "In the first division, underneath the Gothic ornaments, at the top are nine horses, with their riders, marching forth in order: in the next is a line of warriors on foot, brandishing their weapons, and appear to be shouting for the battle. The import of the attitudes in the third division is very dubious, their expression indefinite. The figures, which form a square in the middle of the column, are pretty complex, but distinct; four sergeants with their halberts, guarding a company, under which are placed several human heads, which have belonged to the dead bodies piled up at the left of the division: one appears in the character of executioner, severing the head from another body; behind him are three trumpeters sounding their trumpets, and before him two pair of combatants fighting with sword and target. A troop of horse next appear, put to flight by infantry, whose first lines have bows and arrows, and the three following swords and targets. In the lowermost division now visible, the horses seem to be seized by the victorious party, their riders beheaded, and the head of their chief hung in chains, or placed in a frame; the others being thrown together beside the dead bodies, under an arched cover. The greatest part of the other side of the obelisk, occupied by a sumptuous cross, is covered over with a uniform figure, elaborately raised, and interwoven with great mathematical exactness. Under the cross are two august personages, with some attendants, much obliterated, but evidently in an attitude of reconciliation; and if the monument was erected in memory of the peace concluded between Malcolm and Canute, upon the final retreat of the Danes, these large figures may represent the reconciled monarchs. On the edge, below the fretwork, are some rows of figures joined hand in hand, which may also imply the new degree of confidence and security that took place after the feuds were composed, which are characterized on the front of the pillar. But to whatever particular transaction it may allude, it can hardly be imagined, that in so early an age of the arts in Scotland, as it must have been raised, so elaborate a performance would have been undertaken, but in consequence of an event of the most general importance; it is therefore surprising, that no more distinct tradition of it arrived at the æra when letters were known. The height of this monument, called

King Sueno's Stone, above the ground, is twenty-three feet, besides twelve or fifteen feet under ground. Its breadth is three feet ten inches, by one foot three inches in thickness.



CHAP. LVI.

CURIOSITIES RESPECTING TEMPLES, ETC.—(*Concluded.*)

Inverlochy Castle—Magdalen's Hermitage—Curiosities of Friburg—Curiosities of Augsburg—Escorial—Florence Statues—Great Wall of China—Floating Gardens—Curiosity at Palermo.

INVERLOCHY CASTLE,—is an ancient castle near Fort William, in Inverness-shire. It is adorned with large towers, which, by the mode of building, seem to have been the work of the English, in the time of Edward I. who laid large fines on the Scotch Barons, for the purpose of erecting castles. The largest of these is called Cummin's Tower. "The castle, (says the Rev. Thomas Ross, in his Statistical Account of Kilmanivaig) has survived the burgh, and now stands alone in ancient magnificence, after having seen the river Lochy, that formerly filled its ditches, run in another course, and has outlived all history and tradition of its own builder and age. It is a quadrangular building, with round towers at the angles, measuring thirty yards every way within the walls. The towers and ramparts are solidly built of stone and lime, nine feet thick at the bottom, and eight feet above. The towers are not entire, nor are they all equally high. The western is the highest and largest, and does not seem to have been less than fifty feet when entire; the rampart between them, from twenty-five to thirty. Ten or twelve yards without the wall the ditch begins, which surrounded the castle, from thirty to forty feet broad. The whole building covers about one thousand six hundred yards; and within the outside of the ditch are seven thousand square yards, nearly an acre and a half English. The whole building would require from five hundred to six hundred men to defend it. From the name of the western tower, it is probable this castle was occupied by the Cummins in the time of Edward I. and previous to that period by the Thaness of Lochaber; among others by the noted Bancho, predecessor of the race of Stuart. There is a tradition that this castle was once a royal residence, and that the famous league betwixt Charles the Great of France, and Achaius king of Scots, had been signed there on the part of the Scotch monarch, A. D. 790."

MAGDALEN'S HERMITAGE—This place is situated about a league from Friburg, in Switzerland, and is described by Mr. Blainville, and also by Mr. Addison. They both say it is situated among woods and rocks, in the prettiest solitude imaginable. The hermit, (they say,) who was then alive, had worked out of the rock a pretty chapel, with an altar, sacristy, and steeple; also five chambers, a parlour, refectory, kitchen, cellar, and other conveniences. The funnel of his chimney, which pierces from his kitchen to the top of the rock, slanting all the way, is ninety feet high, and cost him so much toil, that he was a whole year about it, and often despaired of finishing his design. All this must appear the more surprising, when we consider the dimensions of the different parts of this hermitage, the chapel being sixty-three feet in length, thirty-six in breadth, and twenty-two in height. The sacristy, or vestry, is twenty-two feet square, and the height of the steeple seventy feet. The chamber between the chapel and the refectory, is above forty feet long; the refectory itself is twenty-one long; and the cellar is twenty-five feet long, and ten feet deep. But the hall or parlour is particularly admired, being twenty-eight paces in length, twelve in breadth, and twenty feet in height, with four openings for windows; much higher and wider than those of our best houses. At one end of this hall was the hermit's cabinet, with a small collection of books and other curiosities. To add to the pleasantness and convenience of this habitation, he had cut the side of the rock into a flat, and having covered it with good mould, had formed a pretty garden, planted with divers sorts of fruit-trees, herbs, and flowers; and by following the veins of water that dropped from several parts of the rock, he had made himself two or three fountains, which supplied his table, and watered his little garden.

This hermit, whose name was Jean du Pre, began this laborious undertaking at the age of thirty, and said he was twenty-five years in completing it, having had no sort of assistance from any person whatsoever, except one servant. He intended to have carried on his work still farther, but was drowned in 1708, as he was crossing a neighbouring river in a boat, with some company that came to visit him on St. Anthony's day, the patron of his chapel. His place is supplied by a priest, who subsists by the generosity of strangers that come to see the hermitage, whom he generally entertains with bread and wine, and a nosegay.

CURIOSITIES OF FRIBURG.—Friburg is a large town of Switzerland, seated on the Sanen, in a most singular and picturesque situation. Mr. Cox, in his *Travels in Switzerland*, thus describes it: "It stands partly in a small plain, partly

on bold acclivities on a ridge of rugged rocks, half encircled by the river Sanen, and is so entirely concealed by the circumjacent hills, that the traveller scarcely catches the smallest glimpse, until he bursts upon a view of the whole town from the overhanging eminence. The fortifications, which consist of high stone walls and towers, inclose a circumference of about four miles; within which space the eye comprehends a singular mixture of houses, rocks, thickets, and meadows, varying instantly from wild to agreeable, from the bustle of a town to the solitude of the deepest retirement. The Sanen winds in such a serpentine manner, as to form in its course, within the space of two miles, five obtuse angles, between which the intervening parts of the current are parallel to each other. On all sides the descent to the town is extremely steep; in one place the streets often pass over the roofs of the houses. Many of the edifices are raised in regular gradation, like the seats of an amphitheatre; and many overhang the edge of a precipice in such a manner, that, on looking down, a weak head would be apt to turn giddy. But the most extraordinary point of view is from the Pont-neuf. On the north-west a part of the town stands boldly on the sides and the piked back of an abrupt ridge; and from east to west, a semicircle of high perpendicular rocks is seen, whose base is washed and undermined by the winding Sanen, and whose tops and sides are thinly scattered with shrubs and underwood. On the highest points of the rocks, and on the very edge of the precipice, appears, half hanging in the air, the gate called Bourguillon: a stranger standing on the bridge would compare it to Laputa, or the Flying Island, in Gulliver's Travels; and would not conceive it to be accessible, but by means of a cord and pulleys. The houses, constructed with a gray sandstone, are neat and well built; and the public edifices, particularly the cathedral, are extremely elegant."

CURIOSITIES OF AUGSBURG.—In the square, near the town-house, is the Fountain of Augustus, which is a marble bason, surrounded with iron balustrades finely wrought: at the four corners are four brass statues as large as life, two of women, and two of men; in the middle of the bason is a pedestal, at the foot which are four sphinxes, squirting water; a little above these, are four infants holding four dolphins in their arms, which pour water out of their mouths; and over these are festoons and pine-apples of brass; upon the pedestal is the statue of Augustus, as large as life. The fountain most remarkable next to this, is that of Hercules, which is an hexagon bason with several brass figures, particularly Hercules engaging the hydra.—Another curiosity is the Secret Gate, which was contrived to let in persons safely in time of war.

it has so many engines and divisions with gates and keys, and apartments for guards, at some distance from each other, where passengers are examined, that it is impossible for the town to be surprised this way; the gates are bolted and unbolted, opened and shut, by unseen operators, so that it looks like enchantment.—The Water Towers are also very curious, of which there are three, seated on a branch of the Lech, which runs through the city in such a torrent, as to drive many mills, which work a number of pumps, that raise the water in large leaden pipes to the top of the towers. One of these sends water to the public fountains; and the rest, to near one thousand houses in the city.

THE ESCURIAL,—is a royal residence of Spain, fifteen miles north-west of Madrid. It is the largest and most superb structure in the kingdom, and one of the finest in Europe. The word is Arabic, meaning “a place full of rocks.” It is built in a dry barren spot, surrounded with rugged mountains, insomuch that every thing which grows there is owing to art. This place was chosen, it is said, for the sake of the stone wherewith the fabric is built, which is got from a mountain just by, and is very durable; and the design of erecting it was to commemorate a victory which Philip II. obtained over the French (by the assistance of the English forces) at St. Quintin, on St. Lawrence’s day, in the year 1557.

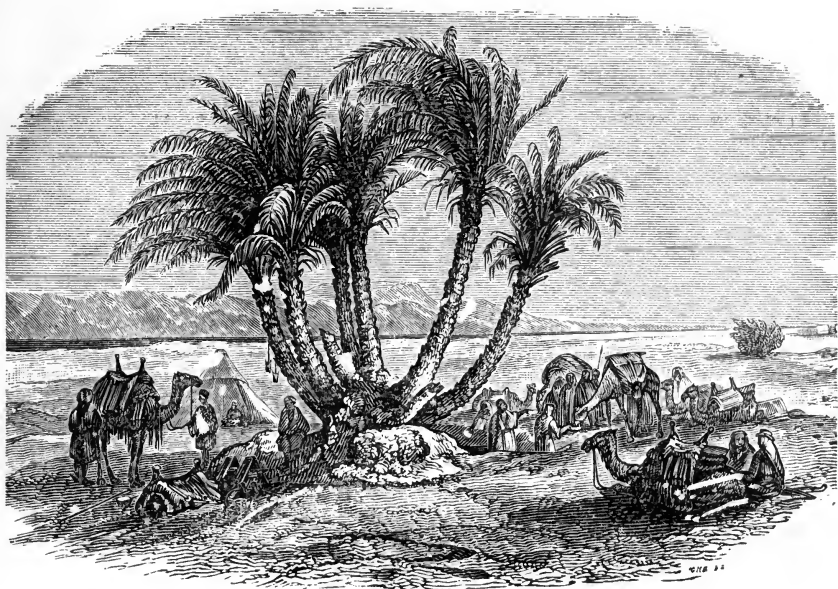
The Spanish description of this structure forms a sizeable quarto volume. Its founder expended upon it six millions of ducats. The apartments are decorated with an astonishing variety of paintings, sculpture, tapestry, ornaments of gold and silver, marble, jasper, gems, and other curious stones, surpassing all imagination. This building, besides its palace, contains a church, large and richly ornamented; a mausoleum; cloisters; a convent; a college; and a library, containing about thirty thousand volumes; besides large apartments for all kinds of artists and mechanics, noble walks, with extensive parks and gardens, beautified with fountains and costly ornaments. The fathers that live in the convent are two hundred, and they have an annual revenue of £12,000.

It was begun by Philip in 1562, five years after the battle, and completed in twenty-two years. It consists of several courts and quadrangles, which all together are disposed in the shape of a gridiron, the instrument of the martyrdom of St. Lawrence; the apartment where the king resides, forming the handle. The building is a long square, of six hundred and forty by five hundred and eighty feet, and the height up to the roof is sixty feet all round, except on the garden side, where the ground is more taken away. At each angle is a square tower, two hundred feet high. The number of windows in the

west front is exactly 200 ; in the east front, 366. The orders are Doric and Ionic. There are three doors in the principal front. Over the grand entrance are the arms of Spain, carved in stone ; and a little higher, in a niche, a statue of St. Lawrence in a deacon's habit, with a gilt gridiron in his right hand, and a book in his left. Directly over the door is a basso-relievo of two enormous gridirons, in stone.

This vast structure, however, with its narrow high towers, small windows, and steep sloping roof, exhibits a very uncouth style of architecture ; at the same time that the domes, and the immense extent of its fronts, render it a wonderfully grand object from every point of view.

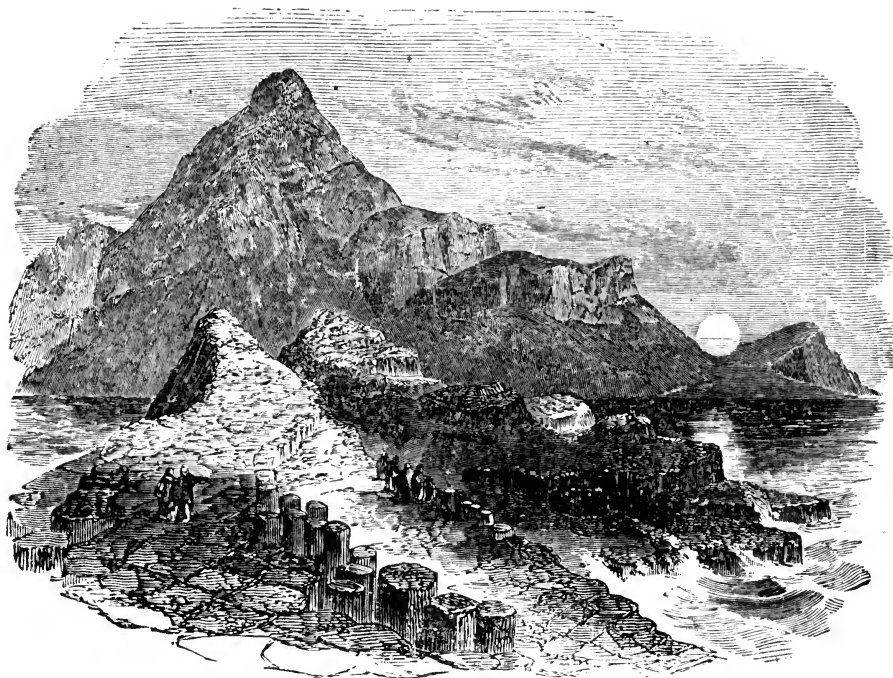
The church is in the centre, is large, awful, and richly ornamented. The cupola is bold and light. The high altar is composed of rich marbles, agates, and jaspers of great rarity, the produce of this kingdom. Two magnificent *catafalcos* fill up the side arcades of this sanctuary ; on one, the emperor Charles V. his wife, daughter, and two sisters, are represented in bronze, larger than life, kneeling ; opposite are the effigies of Philip II. and of his three wives, of the same materials, and in the same devout attitude. Underneath, is the burial-place of the royal family, called the Pantheon : twenty-five steps lead down to this vault, over the door of which is a Latin inscription, denoting, that " this place, sacred to the remains of the Catholic kings, was intended by Charles the emperor, resolved upon by Philip II. begun by Philip III. and completed by Philip IV." The mausoleum is circular, thirty-six feet in diameter, and incrustured with fine marbles in an elegant taste. The bodies of the kings and queens lie in tombs of marble, in niches, one above the other. The plan of these sepulchres is grand, and executed with a princely magnificence ; but, as a modern traveller observes, in a style rather too gay, too light, and too delicately fitted up, for the idea we are apt to form of a chapel destined for the reception of the dead. The collection of pictures dispersed about various parts of the church, sacristy, and convent, has been considered as equal, if not superior, to any gallery in Europe, except that of Dresden. Formed out of the spoils of Italy, and the wasted cabinet of that unfortunate monarch, Charles I. of England, it contains some of the most capital works of the greatest painters that have flourished since the revival of the art. In the sacristy is an altar called *La Santa Forma* : this is a kind of tabernacle of gems, marbles, woods, and other precious materials, inlaid in gilt bronze ; in which, rather than in the excellence of the workmanship, or taste of the design, consists the merit of this rock of riches. Before it hangs a curtain, on which Coello has represented Charles II. and all his court in procession, coming to place this *Forma*.



COCOA-NUT TREES



THE PYRAMIDS OF EGYPT



THE GIANT'S CAUSEWAY,
A stupendous collection of natural columns of basalt, on the coast of Ireland.



THE SPECTRE OF THE BROKEN.
This wonderful and startling phenomenon is often observed in the Hartz Mountains in Germany.

This is esteemed one of the most curious collections of portraits in the world; for all the persons are drawn with the greatest strength of colour and truth of expression, and are said to be perfect resemblances, not only of the monarch and grandees, but even of the monks, servants, and guards. The statues, busts, and the medallions of the Escorial, are neither very numerous, nor remarkable for their excellence; but the library contains a most precious collection of manuscripts, many fine drawings, and other curiosities.

Notwithstanding the coldness of the exposure, the late king, for the sake of hunting, used to pass several months of the year at this palace.

FLORENCE STATUES.—In the Duke of Florence's garden at Pratoline, is the statue of Pan; sitting on a stool, with a wreathed pipe in his hand, and that of Syrinx, beckoning him to play on his pipe. Pan, putting away his stool, and standing up, plays on his pipe; this done, he looks on his mistress, as if he expected thanks from her, takes the stool again, and sits down with a sad countenance.—There is also the statue of a Laundress at her work, turning the clothes up and down with her hand and battledore, wherewith she beats them in the water.—There is the statue of Fame, loudly sounding her trumpet; an artificial toad creeping to and fro; a dragon bowing down his head to drink water, and then vomiting it up again; with divers other pieces of art, that administer wonder and light to the beholders.

THE GREAT WALL OF CHINA.—The principal defence of the empire against a foreign enemy is the Great Wall, which separates China from Tartary, extending more than fifteen hundred miles in length, and of such thickness, that six horsemen may easily ride abreast upon it. It is flanked with towers, two bow-shots distant from one another: Walker says, there are forty-five thousand of these towers, (a number rather incredible,) and that the wall extends two thousand miles. It is said, that a third of the able-bodied men in the empire were employed in constructing this wall. The workmen were ordered, under pain of death, to place the materials so closely, that not the least entrance might be afforded for any instrument of iron; and thus the work was constructed with such solidity, that it is still almost entire, though two thousand years have elapsed since it was constructed.

This extraordinary work is carried, not only through the low lands and valleys, but over hills and mountains; the height of one of which was computed by F. Verbiest, at one thousand two hundred and thirty-six feet above the level of the spot where he stood. According to F. Martini, it begins

at the gulf of Leatong, and reaches to the mountains near the city of Kin, on the Yellow River; between which places it meets with no interruption except to the north of the city of Suen, in Peche-li, where it is interrupted by a ridge of inaccessible mountains, to which it is closely united. It is likewise interrupted by the river Hoang-ho; but for others of an inferior size, arches have been constructed, through which the water passes freely. Mr. Bell informs us, that it is carried across rivers, and over the tops of the highest hills, without the least interruption, keeping nearly along that circular range of barren rocks which incloses the country; and, after running about one thousand two hundred miles, ends in impassable mountains and sandy deserts. The foundation consists of large blocks of stone laid in mortar; but all the rest is of brick. The whole is so strong and well-built, that it scarcely needs any repairs; and in the dry climate in which it stands, may remain in the same condition for many ages. When carried over steep rocks, where no horse can pass, it is about fifteen or twenty feet high; but when running through a valley, or crossing a river, it is about thirty feet high, with square towers and embrasures at equal distances. The top is flat, and paved with cut stone; and where it rises over a rock or eminence, there is an ascent made by an easy stone stair.

This wall (our author adds) was begun and completely finished in the short space of five years; and it is reported, that the labourers stood so close for many miles, that they could hand the materials from one to another. This seems the more probable, as the rugged rocks among which it is built must have prevented all use of carriages; and neither clay for making bricks, nor any kind of cement, are to be found among them.

FLOATING GARDENS.—Abbé Clavigero, in his History of Mexico, says, that when the Mexicans were brought under subjection to the Colhuan and Tapanecan nations, and confined to the miserable little islands on the Lake of Mexico, they had no land to cultivate, until necessity compelled them to form moveable fields and gardens, which floated on the waters of the lake. The method which they adopted to make these, and which they still practise, is extremely simple. They plat and twist together willows and roots of marsh plants, or other materials, which are light, but capable of supporting the earth firmly united. Upon this foundation they lay the light bushes which float on the lake; and over all, the mud and dirt which they draw up from the bottom. Their regular figure is quadrangular; their length and breadth various; but generally they are about eight perches long, and not more than three in breadth, and have less than a foot of elevation

above the surface of the water. These were the first fields which the Mexicans had after the foundation of Mexico; there they first cultivated maize, pepper, and other plants. In time, as these fields became numerous from the industry of the people, they cultivated gardens of flowers and odoriferous plants, which they employed in the worship of their gods, and for the recreation of their nobles. At present they cultivate flowers, and every sort of garden herbs, upon them. Every day at sunrise, innumerable vessels loaded with various kinds of flowers and herbs, cultivated in those gardens, arrive by the canals, at the great market-place of that capital. All plants thrive in them surprisingly; the mud of the lake affords a very fertile soil, and requires no water from the clouds. In the large gardens there is commonly a little tree, and even a little hut, to shelter the cultivator, and defend him from rain or the sun. When the *chinampa*, or owner of a garden, wishes to change his situation, to remove from a disagreeable neighbour, or to come nearer to his own family, he gets into his little vessel, and by his own strength alone, if the garden is small, he tows it after him, and conducts it wherever he pleases. That part of the lake, where these floating gardens are, is a place of high recreation, where the senses receive all possible gratification.

We conclude this chapter with an account of A CURIOUS SIGHT AT PALERMO.

Among the remarkable objects in the vicinity of Palermo, pointed out to strangers, they fail not to particularize a convent of Capuchins, at a small distance from the town, the beautiful gardens of which serve as a public walk. You are shewn under the fabric a vault, divided into four great galleries, into which the light is admitted by windows cut out at the top of each extremity. In this vault are preserved, not in flesh, but in skin and bone, all the Capuchins who have died in the convent since its foundation, as well as the bodies of several persons from the city. There are here private tombs belonging to opulent families, who, even after death, disdain to be confounded with the vulgar part of mankind.

It is said, that in order to secure the preservation of the bodies, they are prepared by being gradually dried before a slow fire, so as to consume the flesh without greatly injuring the skin. When perfectly dry, they are invested with the Capuchin habit, and placed upright on tablets, disposed step above step along the sides of the vault; the head, the arms, and the feet, are naked. A preservation like this is horrid. The skin, discoloured, dry, and as if it had been tanned, nay, torn in some places, is glued close to the bone. It is easy to imagine, from the different grimaces of this numerous

assemblage of fleshless figures, rendered still more frightful by a long beard on the chin, what a hideous spectacle this must exhibit; and whoever has seen a Capuchin alive, may form an idea of the singular effect produced by this repository of dead friars.

CHAP. LVII.

Curiosities respecting the Ark of Noah—The Galley of Hiero— and the Bridge of Xerxes.

THE ARK OF NOAH.—That such a wonderful structure as this once existed, admits not of any doubt in the Jewish, Christian, and Mahomedan world; yet its dimensions far exceed any vessel of modern date, even of the most extensive range, and appear to have been equally unrivalled in ancient times.

There are nevertheless various difficulties which have been proposed in regard to it, among those by whom its existence has been admitted. One question is, as to the time employed by Noah in building it. Interpreters generally believe, that he was an hundred and twenty years in forming this vast structure; but some allow only fifty-two years; some no more than seven or eight, and others still much less. The Mahomedans say, he had but two years allowed him for this work. Another question sometimes agitated is, what kind of wood is meant by gopher wood? Some think cedar, or box; others cypress, the pine, fir-tree, and the turpentine tree. Pelletier prefers the opinion of those who hold the ark to be made of cedar: the reasons he urges for this preference are, the incorruptibility of that wood; the great plenty thereof in Asia; whence Herodotus and Theophrastus relate, that the kings of Egypt and Syria built whole fleets of it in lieu of deal: and the common tradition throughout the East imports, that the ark is preserved entire to this day on mount Ararat.

The dimensions of the ark, as delivered by Moses, are three hundred cubits in length, fifty in breadth, and thirty in height; which, compared with the great number of things it was to contain, seem to many to have been too scanty. And hence an argument has been drawn against the authority of the relation. Celsus long ago laughed at it, calling it the "absurd ark." This difficulty is solved by Buteo and Kircher, who, supposing the common cubit of a foot and a half, prove, geometrically, that the ark was abundantly sufficient for all the animals supposed to be lodged therein. The capacity of the ark will be doubled, if we admit, with Cumberland, &c

that the Jewish cubit was twenty-one thousand eight hundred and eighty-eight inches. Smellius computes the ark to have been above half an acre in area. Cuneus, and others, have also calculated the capacity of the ark. Dr. Arbuthnot computes it to have been eighty-one thousand and sixty-two tons. Father Lamy says, that it was an hundred and ten feet longer than the church of St. Mary at Paris, and sixty-four feet narrower; to which his English translator adds, that it must have been longer than St. Paul's church in London, from west to east, broader than that church is high in the inside, and about fifty-four feet in height of our measure.

The vast assemblage of things contained in the ark, besides eight persons of Noah's family, consisted of one pair of every species of unclean animals, with provisions for them all, during the whole year. The former appears, at first view, almost infinite, but if we come to a calculation, the number of species of animals will be found much smaller than is generally imagined; out of which, in this case, are to be excepted such animals as can live in the water; and Bishop Wilkins imagines, that only seventy-two of the quadruped kind needed a place in the ark.

It appears to have been divided into three stories; and it is agreed on, as most probable, that the lowest story was destined for the beasts, the middle for the food, and the upper for the birds, with Noah and his family; each story being subdivided into different apartments, stalls, &c. Though Josephus, Philo, and other commentators, add a kind of fourth story, under all the rest; being, as it were, the hold of the vessel, to contain the ballast, and receive the filth and ordure of so many animals.

Drexelius makes three hundred apartments; father Fourrier, three hundred and three; the anonymous author of the Questions of Genesis, four hundred; Buteo, Temporarius, Arias Montanus, Wilkins, Lamy, and others, suppose as many partitions as there were different sorts of animals. Pelletier only makes seventy-two, viz. thirty-six for the birds, and as many for the beasts: his reason is, that if we suppose a greater number, as three hundred and thirty-three, or four hundred, each of the eight persons in the ark must have had thirty-seven, forty-one, or fifty stalls to attend and cleanse daily, which he thinks impossible. But there is not much in this: to diminish the number of stalls, without a diminution of the animals, is vain; it being, perhaps, more difficult to take care of three hundred animals in seventy-two stalls, than in three hundred.

Buteo computes, that all the animals contained in the ark, could not be equal to five hundred horses; he even reduces the whole to the dimensions of fifty-six pair of oxen. Father Lamy

enlarges it to sixty-four pair, or an hundred and twenty-eight oxen; so that, supposing one ox equal to two horses, if the ark had room for two hundred and fifty-six horses, there must have been room for all the animals. And the same author demonstrates, that one floor of it would suffice for five hundred horses, allowing nine square feet to a horse.

Of the food contained in the second story, it is observed by Beauteo, from Columella, that thirty or forty pounds of hay ordinarily suffices an ox for a day; and that a solid cubit of hay, as usually pressed down in our hay-ricks, weighs about forty pounds; so that a square cubit of hay is more than enough per day for an ox. Now it appears, that the second story contained one hundred and fifty thousand square cubits; which, divided between two hundred and six oxen, will afford to each, more hay by two-thirds than he can eat in a year.

Bishop Wilkins computes all the carnivorous animals equivalent, as to the bulk of their bodies, and their food, to twenty-seven wolves; and all the rest to two hundred and eighty beeves. For the former he allows the sustenance of eighteen hundred and twenty-five sheep; and for the latter, one hundred and nine thousand five hundred cubits of hay: all which will be easily contained in the two first stories, and much room to spare. As to the third story, nobody doubts of its being sufficient for the fowls, with Noah, his sons, and daughters.

Upon the whole, the learned Bishop remarks, that of the two, it appears much more difficult to assign a sufficient number and bulk of necessary things to answer the capacity of the ark, than to find room enough for the several species of animals already known to have been there. This he attributes to the imperfection of our lists of animals, especially those of the unknown parts of the earth; adding, that the most expert mathematician, at this day, could not assign the proportions of a vessel better accommodated to the purpose, than is here done; and hence finally concludes, that "the capacity of the ark, which has been made an objection against scripture, ought to be esteemed a confirmation of its divine authority: since, in those ruder ages, men, being less versed in arts and philosophy, were more obnoxious to vulgar prejudices than now; so that, had it been of human invention, it would have been contrived according to those wild apprehensions which arise from a confused and general view of things; as much too big, as it has been represented too little."

THE GALLEY OF HIERO.—It is to Hiero that Syracuse was indebted for those amazing machines of war, which the Syracusans made use of when besieged by the Romans. The public buildings, such as palaces, temples, arsenals, &c. which

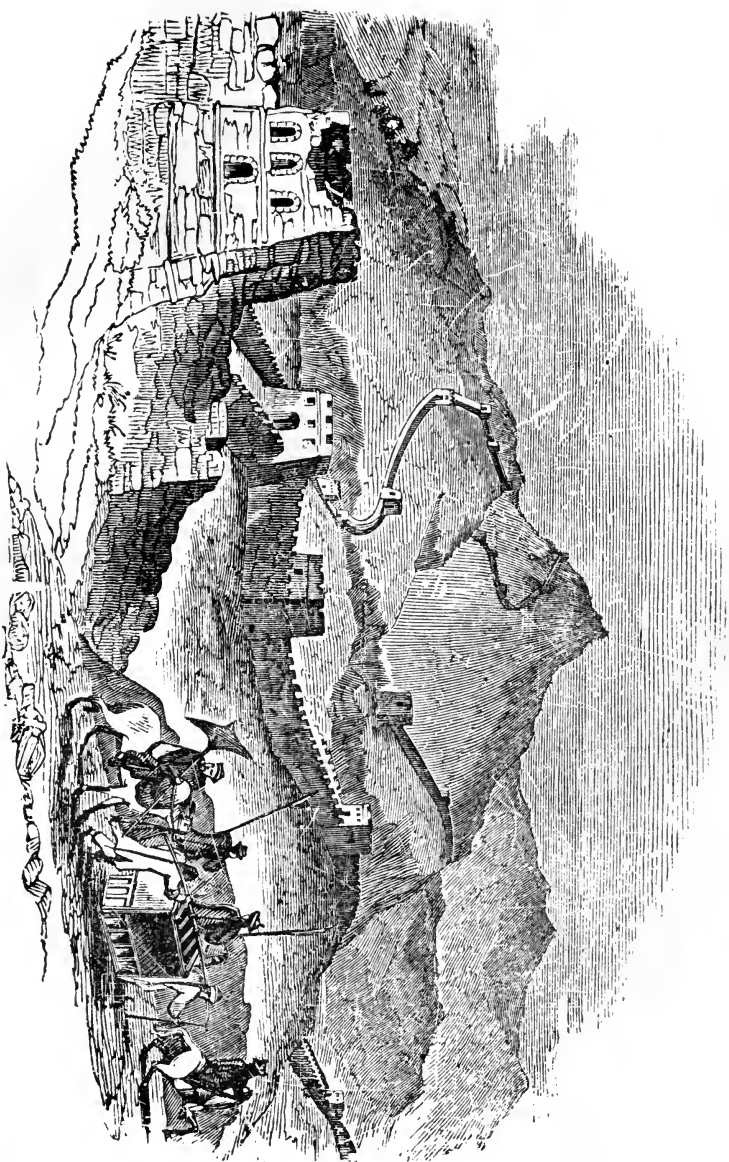
were erected in Syracuse, by his order, and under the direction of Archimedes, were the greatest ornaments of that stately metropolis. He caused also an infinite number of ships to be built, for the exportation of corn, in which the whole riches of the island consisted. We are told of a galley built by his order, which was looked upon as one of the wonders of that age. Archimedes, who was overseer of the work, spent a whole year in finishing it, Hiero daily animating the workmen with his presence. This ship had twenty benches of oars, three spacious apartments, and all the conveniences of a large palace. The floors of the middle apartment were all inlaid, and represented in various colours the stories of Homer's Iliad. The ceilings, windows, and all other parts, were finished with wonderful art, and embellished with all kinds of ornaments. In the uppermost apartment there was a spacious gymnasium, or place of exercise, and walks, with gardens, and plants of all kinds, disposed in wonderful order. Pipes, some of hardened clay, and others of lead, conveyed water all round to refresh them. But the finest of the apartments was that of Venus: the floors were inlaid with agates, and other precious stones; the inside was lined with cypress-wood; and the windows were adorned with ivory, paintings, and small statues. In this apartment there was a library, a bath with three great coppers, and a bathing vessel made of one single stone, of various colours, containing two hundred and fifty quarts. It was supplied with water from a great reservoir at the head of the ship, which held a hundred thousand quarts. The vessel was adorned on all sides with fine paintings, and had eight towers of equal dimensions, two at the head, two at the stern, and four in the middle. Round these towers were parapets, from whence stones might be discharged against the enemy's vessels when they approached. Each tower was constantly guarded by four young men completely armed, and two archers. To the side of the vessel was fastened an engine, made by Archimedes, which threw a stone of three hundred pounds weight, and an arrow eighteen feet in length, the distance of a stadium, or a hundred and twenty-five feet. Though the hold of this vessel was exceedingly deep, a single man could soon clear it of water, with a machine invented for that purpose by Archimedes.

The story of this magnificent vessel was celebrated in poetic numbers by an Athenian poet, for which he was rewarded by Hiero, who understood the value of verse, with a thousand medimni, that is, six thousand bushels of wheat, which he caused to be carried to the Pyræus, or port of Athens. Hiero afterwards made a present of this great vessel to Ptolemy, (probably Philadelphus,) king of Egypt, and sent it to Alexandria. As there was at that time a great famine in Egypt, good

king Hiero sent along with it several other ships of less burden, with three hundred thousand quarters of corn, ten thousand great earthen jars of salt fish, twenty thousand quintals of salt meat, and an immense quantity of other provisions.

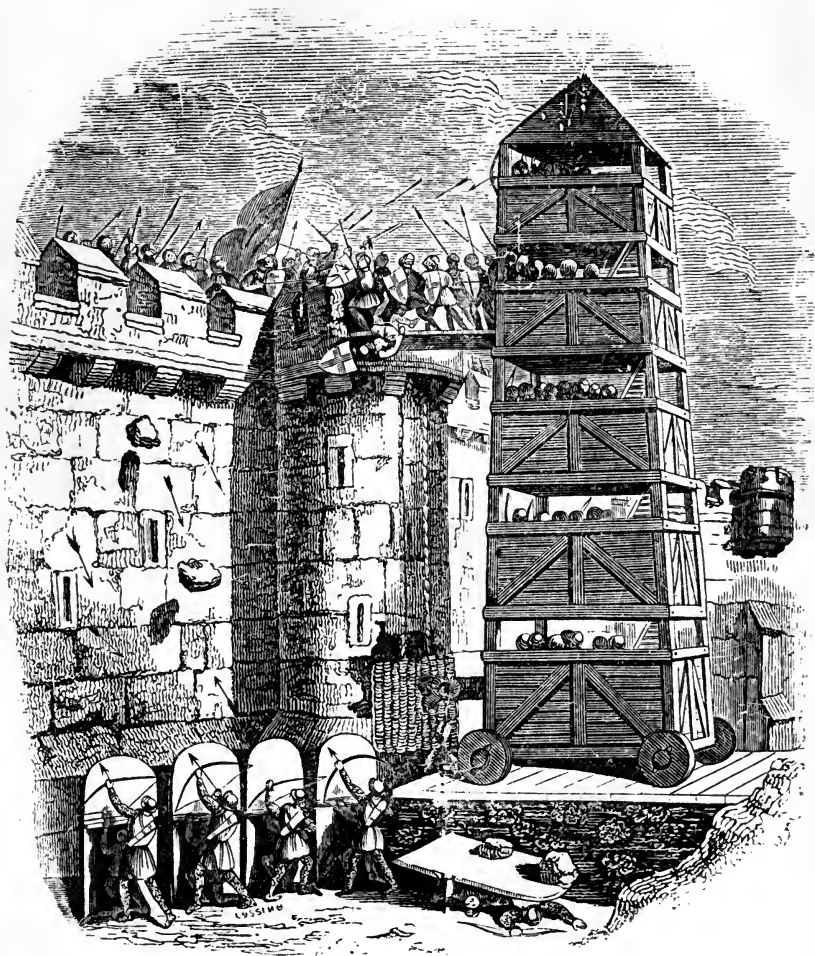
XERXES' BRIDGE OF BOATS OVER THE HELLESPONT.—Xerxes, having resolved to attack Greece, that he might omit nothing which could contribute to the success of his undertaking, entered into an alliance with the Carthaginians, who were, at that time, the most powerful people of the west; whereby it was agreed, that, while the Persians invaded Greece, the Carthaginians should fall upon the Greek colonies in Sicily and Italy, that thereby they might be diverted from helping each other. The Carthaginians appointed Hamilcar their general, who not only raised what forces he could in Africa, but with the money sent him by Xerxes, hired a great many mercenaries in Spain, Gaul, and Italy; so that his army consisted of three hundred thousand men, besides a proportionable number of ships for transporting his forces, and the necessary provisions. Thus Xerxes, agreeable to the prophecy of Daniel, having, by his strength through his riches, stirred up all the nations of the then known world, against the realm of Greece, that is, all the west under the command of Hamilcar, and all the east under his own banners, set out from Susa, to enter upon this war, in the fifth year of his reign, after having spent three years in making vast preparations throughout all the provinces of his wide-spreading empire. From Susa he marched to Sardis, which was the place appointed for the general rendezvous of all his land forces, while his navy advanced along the coasts of Asia Minor, towards the Hellespont.

Two things Xerxes commanded to be done before he came to the sea-side; one of which was, that a passage should be cut through Mount Athos. This mountain reaches a great way into the sea, in the form of a peninsula, and is joined to the land by an isthmus twelve furlongs over. The sea in this place is very tempestuous, and the Persian fleet had formerly suffered shipwreck in doubling this promontory. To prevent the like disaster, Xerxes caused this passage to be cut through the mountain, broad enough to let two galleys, with three banks of oars each, pass in front. By this means, he severed from the continent the cities of Dion, Olophyxus, Acrothoon, Thysus, and Cleone. It is said, however, that Xerxes undertook this enterprise only out of ostentation, and to perpetuate the memory of his name, since he might, with far less trouble, have caused his fleet to be conveyed over the isthmus, as was the practice in those days.



THE GREAT WALL OF CHINA.

Erected to protect the empire from the incursions of the Tartar cavalry.



ANCIENT METHOD OF STORMING A FORT.

He likewise commanded a bridge of boats to be laid over the Hellespont, for the passing of his forces from Asia into Europe. The sea which separates Sestos and Abydos, where the bridge was built, is seven furlongs over. The work was carried on with great expedition by the Phœnicians and Egyptians, who had no sooner finished it, but a violent storm arising, broke it in pieces, and dispersed or dashed against the shore the vessels of which it was composed: which when Xerxes heard, he fell into such a violent transport of anger, that he commanded three hundred stripes to be inflicted on the sea, and a pair of fetters to be thrown into it; enjoining those who were trusted with the execution of his orders, to pronounce these words:—"Thou salt and bitter element, thy master has condemned thee to this punishment, for offending him without cause; and is resolved to pass over thee, in spite of thy billows, and insolent resistance." The extravagant folly and madness of this prince did not stop here, for, to crown the whole, he commanded the heads of those who had the direction of the work to be struck off.

In their room he appointed more experienced architects to build two other bridges, one for the army, the other for the beasts of burden, and the baggage. When the whole work was completed, and the vessels which formed the bridges secure against the violence of the winds, and the current of the water, Xerxes departed from Sardis, where the army had wintered, and directed his march to Abydos. When he arrived at that city, he desired to see all his forces together; and, to that end, ascending a stately edifice of white stone, which the Abydenians had built, on purpose to receive him in a manner suitable to his greatness, he had a free prospect to the coast, seeing at one view both his fleet and land forces. The sea was covered with his ships, and the large plains of Abydos with his troops, quite down to the shore. While he was surveying the vast extent of his power, and deeming himself the most happy of mortals, his joy was suddenly turned into grief; he burst into a flood of tears: which Artabanus perceiving, asked him what had made him, in a few moments, pass from an excess of joy to so great a grief. The king replied, that, considering the shortness of human life, he could not restrain his tears; for, of all these numbers of men, not one, said he, will be alive a hundred years hence. Artabanus, who neglected no opportunity of instilling into the young prince's mind sentiments of kindness towards his people, finding him touched with a sense of tenderness and humanity, endeavoured to make him sensible of the obligation that is incumbent upon princes, to alleviate the sorrows, and sweeten the bitterness, which the lives of their subjects are liable to, since it is not in their power to prolong them. In the same

conversation, Xerxes asked his uncle, whether, if he had not seen the vision which made him change his mind, he would still persist in the same opinion, and dissuade him from making war upon Greece. Artabanus sincerely owned, that he still had his fears, and was very uneasy concerning two things, the sea and the land; the sea, because there were no ports capable of receiving and sheltering such a fleet, if a storm should arise; and the land, because no country could maintain so numerous an army. The king was very sensible of the strength of his reasoning; but as it was now too late to go back, he made answer, that, in great enterprises, men ought not to enter into so nice a discussion of all the inconveniences that may attend them: that bold and daring undertakings, though subject to many evils and dangers, are preferable to inaction, however safe: that great successes are no otherwise to be obtained than by venturing boldly; and that, if his predecessors had observed such scrupulous and timorous rules of politics, the Persian empire would never have attained to so high a degree of glory and grandeur.

All things being now in readiness, and a day appointed for the passing over of the army, as soon as the first rays of the sun began to appear, all sorts of perfumes were burnt upon the bridge, and the way strewed with myrtle. At the same time, Xerxes, pouring a libation into the sea out of a golden cup, and addressing the sun, implored the assistance of that deity, begging that he might meet with no impediment so great, as to hinder him from carrying his conquering arms to the utmost limits of Europe. This done, he threw the cup into the Hellespont, with a golden bowl, and a Persian cimeter; and the foot and horse began to pass over that bridge which was next to the Euxine, while the carriages and beasts of burden passed over the other, which was placed nearer the Ægean sea. The bridges were boarded, and covered over with earth, having rails on each side, that the horses and cattle might not be frightened at the sight of the sea. The army spent seven days and nights in passing over, though they marched day and night, without intermission, and were, by frequent blows, obliged to quicken their pace. At the same time, the fleet made to the coasts of Europe. After the whole army was passed, Xerxes advanced with his land forces, through the Thracian Chersonessus to Doricus, a city at the mouth of the river Hebrus, in Thrace: but the fleet steered a quite different course, standing to the westward for the promontory of Sarpedon, where they were commanded to attend farther orders. Xerxes, having encamped in the large plains of Doriscus, and judging them convenient for reviewing and numbering his troops, dispatched orders to his admirals to bring the fleet to the adjacent shore, that he

might take an account both of his sea and land forces. His land army, upon the muster, was found to consist of one million seven hundred thousand foot, and fourscore thousand horse; which, together with twenty thousand men that conducted the camels, and took care of the baggage, amounted to one million eight hundred thousand men. His fleet consisted of twelve hundred and seven large ships, and three thousand galleys and transports: on board of all these vessels, there were found to be five hundred and seventeen thousand six hundred and ten men. So that the whole number of sea and land forces, which Xerxes led out of Asia to invade Greece, amounted to two millions three hundred and seventeen thousand six hundred and ten men.

We are told, that, on his passing the Hellespont, to enter Europe, an inhabitant of that country cried out: "O Jupiter, why art thou come to destroy Greece, in the shape of a Persian, and under the name of Xerxes, with all mankind following thee; whereas thy own power is sufficient to do this, without their assistance?" After he had entered Europe, the nations on this side the Hellespont that submitted to him, added to his land forces three hundred thousand more, and two hundred and twenty ships to his fleet, on board of which were twenty-four thousand men. So that the whole number of his forces, when he arrived at Thermopylæ, was two millions six hundred and forty-one thousand six hundred and ten men, without including servants, eunuchs, women, sutlers, and other people of that sort, who were computed to equal the number of the forces: so that the whole multitude of persons that followed Xerxes in this expedition, amounted to five millions two hundred and eighty-three thousand two hundred and twenty. Among these millions of men, there was not one that could vie with Xerxes, either in comeliness or stature, or that seemed more worthy of that great empire. But this is a poor recommendation, when unaccompanied with other qualifications of more sterling worth. Accordingly, Justin, after he has mentioned the number of his troops, emphatically concludes, "but this vast body wanted a head." Besides the subordinate generals of each nation, who commanded the troops of their respective countries, the whole army was under the command of six Persian generals: viz. Mardonius, the son of Gobryus: Triatachmes, the son of Artabanus; Smerdones, the son of Otanes (the two latter were cousins to Xerxes;) Masistus, the son of Darius by Atossa; Gerges, the son of Ariazus; and Megabyzus, the son of the celebrated Zopyrus. The ten thousand Persians, who were called the Immortal Band, obeyed no other commander but Hydarnes. The fleet was commanded by four Persian admirals: and likewise the cavalry had their particular generals and commanders.

CHAP. LVIII.

BASALTIC AND ROCKY CURIOSITIES.*Giant's Causeway—Stonehenge.*

GIANT'S CAUSEWAY, IN IRELAND.—The following account is taken from notes of a mineralogical excursion to the Giant's Causeway, by the Rev. Dr. Grierson, as published in the Annals of Philosophy.

"I left (says the Doctor) Colerain on the morning of Sept. 17, in company with a gentleman of that place, whose obligingness, intelligence, hospitality, and kindness, afforded me a most agreeable specimen of the Irish character, and proceeded to Giant's Causeway. The day was charming; and it is not easy for me to express the gratification I felt, as we made our way through a fine and gently varied district, at the idea of having it in my power soon to contemplate in favourable circumstances one of the most stupendous and interesting natural phenomena, that are any where to be seen. From Coleraine to the Causeway is eight miles in a northerly direction, and I could observe no rock on our way, but the trap formation. On crossing the river Bush, at the village called Bushmills, the country begins gradually to rise, and we descry, about two miles before us, a ridge of considerable height, seeming to terminate quite abruptly on the other side. What we perceive is the land side of the precipice of the Giant's Causeway. It seems to have been a hill of basalt, with nearly perpendicular columnar concretions, cut in two, as it were, by a vertical section, and the half of the hill next the sea carried away. On getting in front of this precipice, which you do by a pass on the west side of it, a most stupendous scene presents itself. The precipice, extending for a mile or two along the shore, is in many places quite perpendicular, and often three hundred and fifty and four hundred feet high, consisting of pure columnar basalt, some of the columns fifty feet in perpendicular height, straight and smooth, as if polished with a chisel. In other parts the columns are smaller, inclined, or bent; and a less length of them strikes the eye. From the bottom of this precipice issues, with a gentle slope of about one foot in thirty towards the sea, an immense and surprising pavement, as it were, consisting of the upper ends of the fragments of vertical columns of basalt, that have been left when the seaward half of the basaltic hill was carried off. The ends of these columns are in general fifteen or twenty inches in diameter, some of

them of three sides, some four, five, six, seven, eight, or even nine. Five or six sides seem to prevail most. From the bottom of the precipice to the sea at low water, along this pavement or causeway, which, from the artificial appearance it puts on, has doubtless, in a rude age, given name to the place, is a length of seven hundred and thirty feet. It has been observed to proceed into the ocean as far as can be traced by the eye in a calm and clear day. To any person who has seen both this place and Staffa, the idea naturally enough suggests itself, that they are parts of the same once continuous immense bed of columnar basalt.

"There are properly three pavements proceeding into the sea, distinguished by the names of the Great Causeway, the Middle Causeway, and the West Causeway. These are three large gently sloping ridges of the ends of basaltic columns, with depressions between them, covered with large blocks or masses, that seem to have been from time to time detached, and rolled from the precipice. I had no opportunity of perceiving with what rocks the basalt of the Giant's Causeway is connected. I am told conchoidal white lime-stone meets it on both the east and west sides. There is in one place, near the east side of the Great Causeway, a green-stone vein, eight or ten feet wide, intersecting the basalt from north-west to south-east.

"There was now pointed out to us by the guides a very rare and curious phenomenon, and which is particularly interesting, as it has been thought, by those who hold the igneous origin of basalt, to be a confirmation of their doctrine. Nearly opposite to the West Causeway, and within about eighty feet of the top of the cliff, is found to exist a quantity of slags and ashes, unquestionably the production of fire. On ascending to this spot, which can be easily done, I found the slags and ashes deposited in a sort of bed about four feet thick, and running horizontally along the face of the basaltic precipice twenty or thirty feet. The ashes are in general observed to lie undermost, and the slags above them. They are covered with a considerable quantity of earth and stones, which all consist of basalt, are of a large size, some of them three or four feet or more in diameter, and the ashes likewise rest on the same sort of materials. What struck me here was, that these ashes and slags are entirely unconnected with any rock or formation which seems to be *in situ*, or in its original position. They are therefore, in my opinion, distinctly artificial, and nothing more than the remains of some large and powerful fire, which had been kept burning for a long while on the top of this precipice, used either as a signal, or for some other purpose which we cannot now ascertain; and that, owing to the part of the cliff on which the ashes were lying

having given way and tumbled down, they have been thus buried beneath the ruins, and there remain.

"A considerable way from the repository of the ashes and slags, and to the east of the Great Causeway, is another curious appearance. Here, in the pure basalt, seventy or eighty feet from the top of the cliff, is a horizontal bed of wood coal, eight feet thick. The coal to all appearance rests immediately on the basalt below, and the ends of perpendicular basaltic columns are seen distinctly to rest on it above. The basalt is not in the least changed by the contact of the coal, nor the coal by that of the basalt. The coal is very beautiful and distinct, and in one place is seen a coalified tree, (if I may use the word,) ten or twelve inches in diameter, running directly in below the basalt.

"Within sight of this spot, and about three hundred yards to the east of it, are the beautifully conspicuous basaltic pillars, forty-five feet long, and vertical, with the longest ones in the middle, and others gradually shortening towards each side, like the columns of an organ. From this appearance they have received the appropriate name of *The Organ*.

"At the bottom of this cliff, by examining and breaking the loose columnar pieces of the rock that have fallen down, we found many fine specimens of calcedony, zeolite, and semi-opal. These occur in cavities in the basalt. Sometimes the cavity is not completely filled with the calcedony or opal; and when that is the case, the empty space is observed to be always the upper part of the cavity, while the rock is *in situ*. Moreover, the surface of the calcedony or opal, next to the empty space, is always found to be flat and horizontal, which would shew that the substance must have been filtered into its situation in a fluid state, and afterwards consolidated."

STONEHENGE,—a celebrated monument of antiquity, stands in the middle of a flat area, near the summit of a hill six miles from Salisbury. It is inclosed by a circular double bank and ditch near thirty feet broad, after crossing which, we ascend thirty yards before we reach the work. The whole fabric consisted of two circles and two ovals. The outer circle is about one hundred and eight feet diameter, consisting, when entire, of sixty stones, thirty uprights, and thirty imposts, of which remain only twenty-four uprights, seventeen standing, and seven down, three and a half feet asunder; and eight imposts. Eleven uprights have their five imposts on them by the grand entrance. These stones are from thirteen to twenty feet high. The lesser circle is somewhat more than eight feet from the inside of the outer one, and consisted of forty lesser stones (the highest six feet,) of which only nineteen remain, and only eleven standing: the walk between these two circles is three

hundred feet in circumference. The adytum, or cell, is an oval formed of ten stones, (from sixteen to twenty-two feet high,) in pairs, with imposts, which Dr. Stukeley calls *trilithons*, and above thirty feet high, rising in height as they go round, and each pair separate, and not connected as the outer pair; the highest eight feet. Within these are nineteen smaller single stones, of which only six are standing. Three of the five trilithons at the west end fell flat westward, levelling also in their descent, a stone of the second circle that stood in the line of their precipitation, on the 3d of January, 1797. At the upper end of the adytum is the altar, a large slab of blue coarse marble, twenty inches thick, sixteen feet long, and four broad; pressed down by the weight of the vast stones that have fallen upon it. The whole number of stones, uprights and altar, is exactly one hundred and forty. The stones are far from being artificial, but were most probably brought from those called the Grey Weathers, on Marlborough Downs, fifteen or sixteen miles off; and if tried with a tool, they appear of the same hardness, grain, and colour, generally reddish. The heads of oxen, deer, and other beasts, have been found on digging in and about Stonehenge; and human bones in the circumjacent barrows. There are three entrances from the plain to this structure, the most considerable of which is from the north-east, and at each of them were raised, on the outside of the trench, two huge stones, with two smaller within, parallel to them.

It has long been a dispute among the learned, by what nation, and for what purpose, these enormous stones were collected and arranged. The first account of this structure we meet with, is in Geoffrey of Monmouth, who, in the reign of King Stephen, wrote the History of the Britons, in Latin. He tells us, that it was erected by the counsel of Merlin, the British enchanter, at the command of Aurelius Ambrosius, the British king, in memory of four hundred and sixty Britons, who were murdered by Hengist the Saxon. The next account is that of Polydore Virgil, who says that the Britons erected this as a sepulchral monument of Boadicea, the famous British queen. Inigo Jones is of opinion, that it was a Roman temple, from a stone sixteen feet long, and four broad, placed in an exact position to the east, altar-fashion. Mr. Charlton attributed it to the Danes, who were two years masters of Wiltshire: a tin tablet, on which were some unknown characters, supposed to be Runic, was dug up near it, in the reign of Henry VIII. but is lost.

Its common name, Stonehenge, is Saxon, and signifies a Stone Gallows, to which these stones, having transverse imposts, bear some resemblance. It is also called, in Welsh, *Choir Gawn*, or the Giant's Dance. Mr. Grose thinks that

Dr. Stukeley has completely proved this structure to have been a British temple, in which the Druids officiated. He supposes it to have been the metropolitan temple of Great Britain, and translates the words *choir gawr*, the great choir, or temple. Mr. Bryant is of opinion, that it was erected by a colony of Cuthites, probably before the time of the Druids; because it was usual with them to place one vast stone upon another, for a religious memorial; and these they often placed so equally, that a breath of wind would sometimes make them vibrate. Of such stones, one remains in the pile of Stonehenge. The ancients distinguished stones erected with a religious view, by the name of Amber; by which was signified any thing solar and divine. The Grecians called them *petra ambrosia*. Stonehenge, according to Mr. Bryant, is composed of these amber stones: hence the next town is denominated Ambresbury; not from a Roman Ambrosius, but from the *ambrosia petra*, in whose vicinity it stood. Some of these were Rocking Stones; and there was a wonderful monument of this sort near Penzance, in Cornwall, which still retains the name of Main-amber, or the Sacred Stones. Such a one is mentioned by Apollonius Rhodius, supposed to have been raised in the time of the Argonauts, in the island of Tenos, as the monument of the two-winged sons of Boreas, slain by Hercules; and there are others in China, and other countries.

CHAP. LIX.

CURIOSITIES RESPECTING THE VARIOUS CUSTOMS OF MANKIND

Curious Demonstrations of Friendship—Singularities of different Nations in Eating—Female Beauty and Ornaments—Various Modes of Salutation—Maiden—Lady of the Lamb—Curious Custom respecting Catching a Hare—Extraordinary Ancient Custom.

— Customs,
Though they be never so ridiculous,
Nay, let e'm be unmanly, yet are follow'd.

Shakspeare.

CURIOUS DEMONSTRATIONS OF FRIENDSHIP.—THE demonstrations of friendship in a rude state have a savage and gross character, which it is not a little curious to observe. The Tartars pull a man by the ear to press him to drink, and they continue tormenting him till he opens his mouth; and



THE EMPEROR OF CHINA.



A CHINESE SCHOOL.

when they have accomplished their object, they clap their hands and dance before him.

No customs seem more ridiculous, than those practised by a Kamtschadale, when he wishes to make another his friend. He first invites him to his hut to eat. If the invitation is accepted, the host and his guest strip themselves in a cabin, which is heated to an uncommon degree. While the guest devours the food with which they serve him, the other continually stirs the fire. The stranger must bear the excess of the heat, as well as of the repast. He discharges the food from his stomach ten times before he will yield ; but at length, obliged to acknowledge himself overcome, he begins to compound matters. He purchases a moment's respite by a present of clothes or dogs ; for his host threatens to heat the cabin, and to oblige him to eat till he dies. The stranger has the right of retaliation allowed to him : he treats the other in the same manner, and exacts the same presents. Should his host not accept the invitation of his guest, whom he has so handsomely regaled, he would come and inhabit his cabin, till he had obtained from him the presents he had in so singular a manner given to him.

For this extravagant custom a curious reason has been alleged. It is meant to put the person to a trial, where friendship is sought. The Kamtschadale, who is at the expense of the fires and the repast, is desirous to know if the stranger has the strength to support pain with him, and if he is generous enough to share with him some part of his property. While the guest is employed on his meal, he continues heating the cabin to an insupportable degree, and, as a last proof of the stranger's constancy and attachment, he exacts more clothes and more dogs. The host passes through the same ceremonies in the cabin of the stranger ; and he shews in his turn, with what degree of fortitude he can defend his friend.—It is thus the most singular customs would appear simple, if it were possible for the philosopher to contemplate them on the spot.

As a distinguishing mark of esteem, two friendly Negroes of Ardra drink out of one cup at the same time. The king of Loango eats in one house, and drinks in another. A Kamtschadale kneels before his guest ; he cuts an enormous slice from a sea-calf ; he crams it entire into the mouth of his friend, furiously crying out, *Tana!* (There!) and cutting away what hangs about his lips, snatches and swallows it with avidity.

SINGULARITIES OF DIFFERENT NATIONS IN EATING.—The Maldivian islanders eat alone. They retire into the most hidden parts of their houses : when they draw down the cloths

that serve as blinds to their windows, that they may eat unobserved. This custom probably arises from the savage, in the early periods of society, concealing himself to eat, from a fear that another with as sharp an appetite, but possessing more bodily strength than himself, should come and ravish his meal from him. The powerful ideas of witchcraft, too, are widely spread among barbarians; and they are not a little fearful that some incantation may be made use of while devouring their victuals.

In noticing the solitary meal of the Maldivian islander, another reason may be alleged for this misanthropical repast. They never will eat with any one who is inferior to them in birth, in riches, or in dignity; and as it is a difficult matter to settle this equality, they are condemned to lead this unsociable life.

On the contrary, the islanders of the Philippines are remarkably sociable. Whenever one of them finds himself without a companion to partake of his meal, he runs till he meets with one; and we are assured, that, however keen his appetite may be, he ventures not to satisfy it without a guest.

The tables of the rich Chinese shine with a beautiful varnish, and are covered with silk carpets very elegantly worked. They do not make use of plates, or knives and forks: every guest has two little ivory or ebony sticks, which he handles very adroitly.

The Otaheiteans, who are lovers of society, and very gentle in their manners, feed separately from each other. At the hour of repast, the members of each family divide; two brothers, two sisters, and even husband and wife, father and mother, have each their respective basket.

They place themselves at the distance of two or three yards from each other; they turn their backs to their companions, and take their meal in profound silence.

Various are the opinions and customs of mankind with respect to FEMALE BEAUTY AND ORNAMENTS,—as will be perceived from the following prejudices of different nations.

The ladies in Japan gild their teeth; and those of the Indies paint them red. The blackest teeth are esteemed the most beautiful in Guzerat, and in some parts of America. In Greenland the women colour their faces with blue and yellow; and a Muscovite lady would consider her beauty incomplete, unless she were plastered over with paint, however prodigal nature may have been in her gifts. The Chinese must have their feet as diminutive as those of the she-goats, and to render them thus, their youth is passed in tortures. In ancient Persia, an aquiline nose was often thought worthy of the crown; and if there was any competition between two princes,

the people generally went by this criterion of majesty. In some countries, the mothers break the noses of their children; and others press the head between two boards, that it may become square. The modern Persians have a strong aversion to red hair: the Turks, on the contrary, are warm admirers of it. The Indian beauty is thickly smeared with bear's fat; while the female Hottentot regrets, not the absence of silks and wreaths of flowers, if she can but receive from the hand of her lover the warm entrails and reeking tripe of animals he has just slaughtered, that she may deck herself with these enviable ornaments.

In China, small eyes are liked; and the girls are continually plucking their eyebrows, that they may be small and long. The Turkish women dip a gold brush in the tincture of a black drug, which they pass over their eyebrows. This is too visible by day, but it looks shining by night. They also tinge their nails with a rose colour.

An ornament for the nose appears to us perfectly unnecessary. The Peruvians, however, think otherwise; and they hang on it a weighty ring, the thickness of which is regulated by the rank of their husbands. The custom of boring the nose, as our ladies do their ears, is very common in several nations. Through the perforation are hung various materials; such as green crystal, gold, stones, a single and sometimes a great number of gold rings, which become at times rather troublesome to them.

The female head-dress is carried in some countries to singular extravagance. The Chinese fair carries on her head the figure of a certain bird. This bird is composed of copper or of gold, according to the quality of the person: the wings spread out, fall over the front of the head-dress, and conceal the temples; the tail, long and open, forms a beautiful tuft of feathers; the beak covers the top of the nose; the neck is fastened to the body of the artificial animal by a spring, that it may the more freely play, and tremble at the slightest motion.

The extravagance of the Myantsees is far more ridiculous than the above. They carry on their heads a slight board, rather longer than the foot, and about six inches broad: with this they cover their hair, and seal it with wax. They cannot lie down, nor lean, without keeping the neck very straight; and the country being very woody, it is not uncommon to find them with their head-dress entangled in the trees. Whenever they comb their hair, they pass an hour by the fire in melting the wax; but this combing is only performed once or twice a year.

To this curious account, extracted from Duhalde, we must join that of the inhabitants of the land of Natal. They wear

caps or bonnets, from six to ten inches high, composed of the fat of oxen. They then gradually anoint the head with a purer grease, which mixing with the hair, fastens these bonnets for their lives.

The reader will be amused with the following account of THE VARIOUS MODES OF SALUTATION.—When men, says the compiler of *L'Esprit des Usages et des Coutumes*, salute each other in an amicable manner, it signifies little whether they move a particular part of the body, or practise a particular ceremony. In these actions there must exist different customs. Every nation imagines it employs the most reasonable ones. This infinite number of ceremonies may be reduced to two kinds; to reverences or salutations, and to the touch of some part of the human body. Modes of salutation have very different characters, and it is not uninteresting to examine their shades. Many display a refinement of delicacy; while others are remarkable for their simplicity, or sensibility.

The islanders near the Philippines take the hand or foot of him they salute, and with it they gently rub their face. The Laplanders apply their nose strongly against that of the persons they salute. Dampier says, that at New Guinea they are satisfied in placing on their heads the leaves of trees, which have ever passed for symbols of friendship and peace. Other salutations are very inconvenient: it requires great practice to enable a man to be polite in an island in the straits of the Sound. Houtman tells us, “they raised his left foot, which they passed gently over the right leg, and thence over his face.” The inhabitants of the Philippines bend their bodies very low, in placing their hands on their cheeks, and raising at the same time one foot in the air, with their knee bent. An Ethiopian takes the robe of another, and ties it about his own waist, so that he leaves his friend half naked. This custom of undressing takes other forms: sometimes men place themselves naked before the person whom they salute, to show their humility, and that they are unworthy of a covering in his presence. This was practised before Sir Joseph Banks, when he received the visit of two Otaheitan ladies. Their innocent simplicity did not appear immodest in the eyes of the *virtuoso*. Sometimes they only undress partially. The Japanese only take off a slipper; the people of Arracan their sandals in the street, and their stockings in the house. The grandees of Spain claim the right of appearing covered before the king, to shew that they are not so much subjected to him as the rest of the nation.

Snelgrave gives an odd representation of the embassy which the king of Dahomy sent to him. The ceremonies of

salutations consisted in the most ridiculous contortions. When two negro monarchs visit, they salute by snapping three times the middle finger. Barbarous nations frequently imprint on their salutations their character. When the inhabitants of Carmenta (says Athenæus) would shew a peculiar mark of esteem, they breathed a vein, and presented for the beverage of their friend the blood as it issued. The Franks tore hair from their head, and presented it to the person whom they saluted. The slave cut his hair, and offered it to his master. The Chinese are singularly affected in their personal civilities: they even calculate the number of their reverences. The men move their hands in an affectionate manner, while they are joined together on their breast, and bow their head a little. If two persons meet after a long separation, they both fall on their knees and bend their faces to the earth, and this they repeat two or three times. They substitute artificial ceremonies for natural actions. Their expressions mean as little as their ceremonies. If a Chinese is asked how he finds himself in health? He answers, "Very well, thanks to your abundant felicity." If they would tell a man that he looks well, they say, "Prosperity is painted on your face;" or, "Your air announces your happiness." All these and many other answers are prescribed by the Chinese academy of compliments. There are determined the number of bows, the expressions to be employed, the genuflections, and the inclinations to be made to the right or left hand, the salutations of the master before the chair, where the stranger is to be seated, for he salutes it most profoundly, and wipes the dust away with the skirts of his robe. The lower class of people are equally nice in these punctilios; and ambassadors pass forty days in practising them before they can appear at court. A tribunal of ceremonies has been erected, and every day very odd decrees are issued, to which the Chinese most religiously submit. The marks of honour are frequently arbitrary: to be seated, with us, is a mark of repose and familiarity; to stand up, that of respect. There are countries, however, in which princes will only be addressed by persons who are seated, and it is considered as a favour to be permitted to stand in their presence. This custom prevails in despotic countries: a despot cannot suffer, without disgust, the elevated figure of his subjects; he is pleased to bend their bodies with their genius; his presence must lay those who behold him prostrate on the earth; he desires no eagerness, no attention; he would only inspire terror.

We shall next give an account of THE MAIDEN.—This term is applied to an ancient English custom, or, more properly, to an instrument for beheading criminals; of the use

and form of which Mr. Pennant gives the following account: "It seems to have been confined to the limits of the forest of Hardwick, or the eighteen towns and hamlets within its precincts. The time when this custom took place is unknown; whether Earl Warren, lord of this forest, might have established it among the sanguinary laws then in use against the invaders of the hunting rights, or whether it might not take place after the woollen manufactures at Halifax began to gain strength, is uncertain. The last is very probable, for the wild country around the town was inhabited by a lawless set, whose depredations on the cloth-tenters might soon stifle the efforts of infant industry. For the protection of trade, and for the greater terror of offenders by speedy execution, this custom seems to be established, so as at last to receive the force of law, which was 'That if a felon be taken within the liberty of the forest of Hardwick, with goods stolen out, or within the said precincts, either handhaband, backberand, or confessed, to the value of thirteen-pence-halfpenny, he shall, after three market days, or meeting days, within the town of Halifax, next after such his apprehension, and being condemned, be taken to the gibbet, and there have his head cut from his body.' The offender had always a fair trial; for as soon as he was taken, he was brought to the lord's bailiff, at Halifax: he was then exposed to the three markets, (which here were held thrice in a week,) placed in the stocks, with the goods stolen on his back, or, if the theft was of the cattle kind, they were placed by him; and this was done both to strike terror into others, and to produce new informations against him.

'The bailiff then summoned four freeholders of each town within the forest, to form a jury. The felon and prosecutors were brought face to face; and the goods, the cow, or horse, or whatsoever was stolen, produced. If he was found guilty, he was remanded to prison, had a week's time allowed for preparation, and then was conveyed to this spot, where his head was struck off with this machine. I should have premised, that if the criminal, either on apprehension, or in the way of execution, should escape out of the limits of the forest, (part being close to the town,) the bailiff had no further power over him, but if he should be caught within the precincts at any time after, he was immediately executed on his former sentence.

"This privilege was very freely used during the reign of Elizabeth; the records before that time are lost. Twenty-five suffered in her reign, and at least twelve from 1623 to 1650; after which, I believe, the privilege was no more exerted.

"This machine of leath is now destroyed; but I saw one of the same kind in a room under the parliament-house at

Edinburgh, where it was introduced by the regent Morton, who took a model of it as he passed through Halifax, and at length suffered by it himself. It is in form of a painter's easel, and about ten feet high: at four feet from the bottom is a cross bar, on which the felon lays his head, which is kept down by another placed above. In the inner edges of the frames are grooves; in these is placed a sharp axe, with a vast weight of lead, supported at the very summit with a peg: to that peg is fastened a cord, which the executioner cutting, the axe falls, and does the affair effectually, without suffering the unhappy criminal to undergo a repetition of strokes, as has been the case in the common method. I must add, that if the sufferer is condemned for stealing a horse or a cow, the string is tied to the beast, which, on being whipped, pulls out the peg, and becomes the executioner." This apparatus is now in possession of the Scottish Antiquarian Society.

LADY OF THE LAMB.—At Kidlington, in Oxfordshire, there is a custom, that on the next Monday after Whitsun-week, there is a fat live lamb provided, and the maids of the town, having their thumbs tied behind them, run after it; and she that with her mouth takes and holds the lamb, is declared Lady of the Lamb,—which being dressed by the butcher, with the skin hanging on, is carried on a long pole before the lady and her companions to the green, attended with music, and a morisco-dance of men, and another of women, where the rest of the day is spent in dancing, mirth, and merry glee. The next day the lamb is part baked, boiled, and roasted, for the lady's feast; where she sits majestically, at the upper end of the table, and her companions with her, with music and other attendants, which ends the ceremony.

The following is a **CURIOUS CUSTOM RESPECTING CATCHING A HARE.**—They have an ancient custom at Coleshill, in the county of Warwick, that if the young men of the town can catch a hare, and bring it to the parson of the parish, before ten of the clock on Easter Monday, the parson is bound to give them a calf's head, and an hundred of eggs for their breakfast, and a groat in money.

This chapter concludes with an account of an **EXTRAORDINARY ANCIENT CUSTOM.**—A court, called Lawless Court, is held annually on Kingshill, at Rochford, in Essex, on Wednesday morning next after Michaelmas-day, at cock-crowing, at which court the whole of the business is transacted in a whisper; no candle is allowed in the court, nor any pen and ink, but the proceedings are written with a piece of charcoal, and he that holds suit and service there, and does not appear,

forfeits double the amount of his rent to the lord of the manor. This court is mentioned by Camden, who says, "the servile attendance was imposed on the tenants for conspiring at the like unseasonable time to raise a commotion." It belongs to the honour of Raleigh, and is called Lawless, because held at an unlawful hour, or, *quia dicta sine lege*.



CHAP. LX.

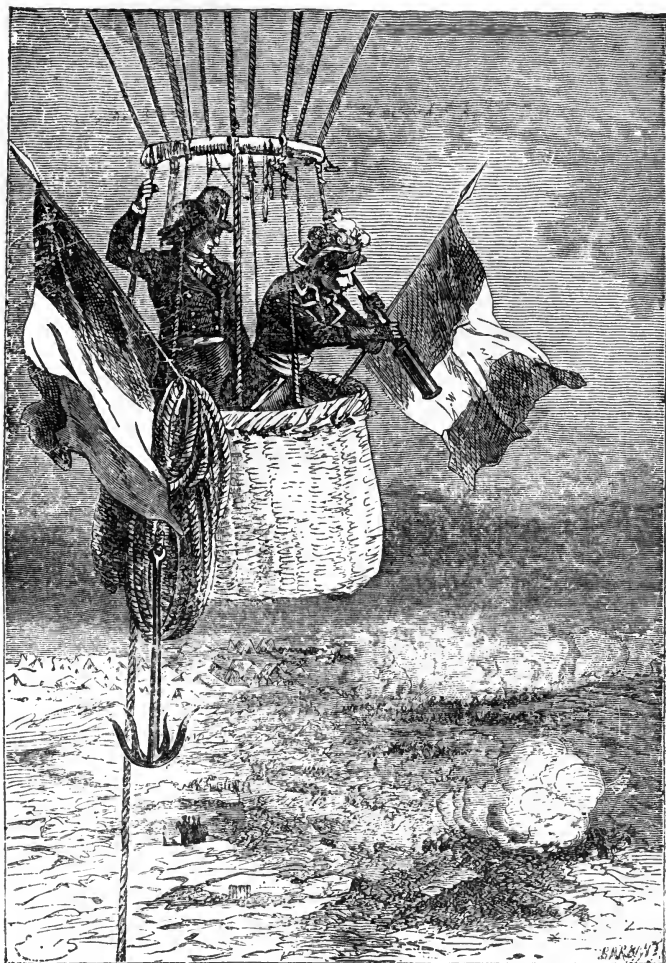
CURIOSITIES RESPECTING THE CUSTOMS OF MANKIND.— (Continued.)

Marriage Ceremonies of different Nations—Marriage Custom of the Japanese—Bacon Flitch Custom at Dunmow, Essex—On the Origin of Rings in general—Matrimonial Ring—Extraordinary Marriage Custom—Hand-Fasting.

Tho' fools spurn Hymen's gentle pow'rs,
They who improve his golden hours,
By sweet experience know,
That marriage, rightly understood,
Gives to the tender and the good
A paradise below.

Cotton.

MARRIAGE CEREMONIES OF DIFFERENT NATIONS.—Marriage ceremonies vary in different countries, and at different times. Where the practice is to purchase a wife, whether among savages, or among luxurious people in hot climates, payment of the price completes this marriage, without any other ceremony. Other ceremonies, however, are sometimes practised. In old Rome, the bride was attended to the bridegroom's house, with a female slave carrying a distaff and a spindle, importing that she ought to spin for the family. Among the savages of Canada, and of neighbouring countries, a strap, a kettle, and a faggot, are put in the bride's cabin, as symbols of her duty, viz. to carry burdens, to dress victuals, and to provide wood. On the other hand, the bride, in token of her slavery, takes her axe, cuts wood, bundles it up, and lays it before the door of the bridegroom's hut. All the salutation she receives is, "It is time to go to rest." The inhabitants of Sierra Leone, on the coast of Africa, have in all their towns a boarding-school, where young ladies are educated for a year, under the care of a venerable old gentleman. When their education is completed, they are carried in their best attire to a public assembly; which may be termed a matrimonial market, because there young men con-



WITNESSING A BATTLE FROM THE CLOUDS



EGYPTIAN SHOPKEEPER.

vene to make a choice. Those who fit themselves to their fancy pay the dowry; and, over and above, reward the old superintendant for his extraordinary care in educating the bride. In the island of Java, the bride, in token of subjection, washes the bridegroom's feet; and this is a capital ceremony. In Russia, the bride presents to the bridegroom a bundle of rods, to be used against her when she deserves to be chastised; and at the same time she pulls off his boots. Very different were the manners of Peru before the Spanish conquest. The bridegroom carried shoes to the bride, and put them on with his own hands; but there, purchasing wives is unknown. Marriage ceremonies in Lapland are directed by the same principle. It is the custom there, for a man to make presents to his children of rein-deer; and young women who have a large stock of these animals, have lovers in plenty. A young man looks for such a wife at a fair, or at a meeting for paying taxes. Being solicitous, in particular, to have an eloquent pleader, he carries to the house of the young woman some of his relations. They are all admitted except the lover, who must wait till he be called in. After drinking some spirits, brought with them for the purpose, the spokesman addresses the father in humble terms, bowing the knee, as if he were introduced to a prince. He styles him the worshipful father, the high and mighty father, the best and most illustrious father, &c.

The marriage ceremonies among the Hottentots are of a singular nature. After all matters are adjusted among the old people, the young couple are shut up by themselves; and pass the night in struggling for superiority, which proves a very serious work, where the bride is reluctant. If she persevere to the last without yielding, the young man is discarded; but, if he prevail, which commonly happens, the marriage is completed by another ceremony, no less singular. The men and women squat on the ground in different circles, the bridegroom in the centre of one, and the bride in the centre of another, where ceremonies of a most indelicate nature take place. The ceremonies among the present Greeks are no less remarkable. Among other particulars, the bridegroom and bride walk three rounds; during which they are kicked and cuffed heartily. Tournefort adds, that he only and his companions forbore to join in the ceremony; which was ascribed to their rusticity, and ignorance of polite manners. Marriage ceremonies among the Kamtschadales are extremely whimsical. A young man, after making his proposals, enters into the presence of his intended father-in-law. If he prove agreeable, he is admitted to the trial of the touch. The young woman is swaddled up in leathern thongs, and in that condition is put under the guard of some old women.

Watching every opportunity of a slack guard, he endeavours to uncase her, in order to touch what is always the most concealed. The bride must resist, in appearance at least; and therefore cries out for her guards, who fall with fury on the bridegroom, tear his hair, scratch his face, and act in violent opposition. The attempts of the lover sometimes prove unsuccessful for months; but the moment the touch is achieved, the bride testifies her satisfaction, by pronouncing the word *Ni, Ni*, with a soft and loving voice. The next night they associate together without any opposition.

One marriage ceremony among the island negroes is singular. As soon as preliminaries are adjusted, the bridegroom, with a number of his companions, set out at night, and surround the house of the bride, as if intending to carry her off by force. She and her female attendants, pretending to make all possible resistance, cry aloud for help, but no person appears. This resembles strongly a marriage ceremony that is, or was, customary in Wales. On the morning of the wedding-day, the bridegroom, accompanied with his friends on horseback, demands the bride. Her friends, who are likewise on horseback, give a positive refusal; upon which a mock scuffle ensues. The bride, mounted behind her nearest kinsman, is carried off, and is pursued by the bridegroom and his friends, with loud shouts. It is not uncommon on such an occasion to see two or three hundred sturdy Cambro-Britons riding at full speed, crossing and jostling, to the no small amusement of the spectators. When they have fatigued themselves and their horses, the bridegroom is suffered to overtake his bride. He leads her away in triumph, and the scene is concluded with feasting and festivity. The same marriage ceremony was usual in Muscovy, Lithuania, and Livonia, as reported by Olaus Magnus.

MARRIAGE CUSTOM OF THE JAPANESE.—A very singular custom at the marriages of the Japanese, is, that the teeth of the bride are made black by some corrosive liquid. The teeth remain black ever after, and serve to shew that a woman is married, or a widow. Another circumstance is, at the birth of every child, to plant a tree in a garden or court-yard, which attains its full growth in as many years as a man requires to be mature for the duties of marriage. When he marries, the tree is cut down, and the wood is made into chests and boxes, to contain the clothes and other things which are made for the new-married couple.

The Japanese may marry as often as they please: marriages with sisters are prohibited, but they can marry any other relative.

BACON FLITCH CUSTOM AT DUNMOW, ESSEX.—Many persons who are so often jocular about a certain “Flitch of Bacon,” with those who are supposed to be in a much happier state than themselves, are not always familiar with the origin of this institution, and with the whimsical rhyming oath to be taken with the flitch. Old Fuller has preserved it, in his very scarce work of the *Worthies*; and it will probably amuse those who have more wit than reading on this occasion.

The celebrated flitch of bacon of Dunmow, in Essex, which can only be claimed, without perjury, by a select few in the married state, was a jocular institution by the monks of a monastery, in the priory of Dunmow, in Essex. Fuller observes, that these mortified men would be mirthful at times, as hereby may appear.—

“Any person from any part of England, coming hither, and humbly kneeling on two stones at the church door (which are yet to be seen,) before the priory or convent, might demand a gammon or flitch of bacon, upon the solemn taking of the prescribed oath.

The following is a copy of the register of the form and ceremony observed on a claim made more than a century ago, to this flitch of bacon, by William Parsley, of Much-Easton, and Jane, his wife.

Dunmow, Nuper.—At a court baron of the Priorat’ right worshipful Sir Thomas May, knight, there holden upon Friday the seventh of June, in the thirteenth year of the reign of our sovereign Lord William III. by the grace of God, &c. and in the year of our Lord, 1701, before Thomas Wheeler, gent steward of the said manor. It is thus enrolled :—

Homage.	{	“ ELIZABETH BEAUMONT, spinster, HENRIETTA BEAUMONT, spinster, ANNABELLA BEAUMONT, spinster, JANE BEAUMONT, spinster, MARY WHELER, spinster,	}	Jurat.
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“Be it remembered, that at this court, in full and open court, it is found, and presented by the homage aforesaid, that William Parsley, of Much-Easton, in the county of Essex, butcher, and Jane his wife, have been married for the space of three years the last past, and upward; and it is likewise found, presented, and adjudged, by the homage aforesaid, that the said William Parsley, and Jane his wife, by means of their quiet, peaceable, tender, and loving cohabitation, for the space of time aforesaid, (as appears by the said homage,) are fit and qualified persons to be admitted by the court to receive the ancient and accustomed oath, whereby to entitle themselves to have the bacon of Dunmow delivered unto them, according to the custom of the manor.

“Whereupon, at this court, in full and open court, came

The ring was reputed, by some nations, a symbol of liberality, esteem, and friendship, particularly among the Persians, none being permitted to wear any, except given to him from the king himself. This is what may also be remarked in the person of Apollonius Thyaneus, who, as a token of singular esteem and great liberality, received one from the great Jarchas, prince of the gymnosophists, who were the ancient priests of the Indies, and dwelt in forests, as our bards and Druids, where they applied themselves to the study of wisdom, and to the speculation of the heavens and stars. This philosopher, by the means of that ring, learned every day the greatest secrets in nature.

Though the ring found by Gyges, shepherd to the king of Lydia, has more of fable than truth in it, it will not, however, be amiss to relate what is said concerning Herodotus, Cælius after Plato, and Cicero, in the third book of his Offices. This Gyges, after a great flood, passed into a very deep cavity in the earth, where having found, in the belly of a brazen horse, with a large aperture in it, a human body of enormous size, he pulled from off one of the fingers, a ring of surprising virtue; for the stone on the collet rendered him who wore it invisible, when the collet was turned towards the palm of the hand; so that the party could see, without being seen, all manner of persons and things. Gyges, having made trial of its efficacy, bethought himself that it would be a means for ascending the throne of Lydia, and for gaining the queen by it. He succeeded in his designs, having killed Candaules, her husband. The dead body this ring belonged to was that of an ancient Brahmin, who in his time was chief of all. The rings of the ancients often served for seals. Alexander the Great, after the defeat and death of Darius, used his ring for sealing the letters he sent into Asia, and his own for those he sent to Europe. It was customary in Rome for the bridegroom to send the bride, before marriage, a ring of iron, without either stone or collet, to denote how lasting their union ought to be, and the frugality they were to observe together; but luxury herein soon gained ground, and there was a necessity of moderating it. Caius Marius did not wear one of gold till his third consulship: and Tiberius, as Suetonius says, made some regulation in the authority of wearing rings; for besides the liberty of birth, he required a considerable revenue, both on the father and grandfather's side.

In the preceding dissertation we have anticipated the MATRIMONIAL RING, therefore our further observations need be but few.

Swinburne says, the iron ring was adorned with an adamant, the metal hard and durable, signifying the duration and pros-

perity of the contract. "Howbeit," he says, "it skilleth not at this day what metal the ring be of. The form of it being round, and without end, doth import that their love should circulate and flow continually. The finger on which this ring is to be worn, is the fourth finger on the left hand, next unto the little finger, because there was supposed a vein of blood to pass from thence into the heart."

"We shall conclude this chapter with an account of an ancient custom, called HAND-FASTING.

This custom formerly took place at an annual fair, in the parish of Eskdale-muir, in Dumfriesshire, thus described by the Rev. W. Brown, in his Statistical Account of that parish: "At that fair it was the custom for the unmarried persons of both sexes, to choose companions with whom they were to live till that time next year. If they were pleased with each other at that time, then they continued together for life; if not, they separated, and were free to make another choice, as at first. The fruit of their connection, if there were any, was always attached to the disaffected person. A priest, whom they named Book-i'-bosom, (because he carried in his bosom a Bible, or a register of the marriages,) came from time to time to confirm the marriages." Mr. Brown traces this custom from the Romans.—See *Sir J. Sinclair's Statistical Account*, vol. xii. p. 615.



CHAP. LXI.

CURIOSITIES RESPECTING THE CUSTOMS OF MANKIND.— (Continued.)

Funeral Ceremonies of the Ancient Ethiopians—Funeral Ceremonies of the Chinese—Ancient Funeral Ceremonies of the Dajakkes—Ancient Modes of Mourning—Feasts among the Ancients of various Nations—Feast of Lanterns.

FUNERAL CEREMONIES OF THE ANCIENT ETHIOPIANS.—The Ethiopians had very particular ceremonies in their funerals. According to Ctesias, after having salted the bodies, they put them into a hollow statue of gold, which resembled the deceased, and are placed in a niche, on a pillar set up for that purpose. The remains of the richest Ethiopians were thus honoured: the bodies of those of the next class were contained in silver statues; the poor were enshrined in statues of earthenware. Herodotus informs us, that the nearest relations of the dead kept the body a year in their houses,

and offered sacrifice and first-fruits during that time to their deceased friend; and at the end of the year, they fixed the corpse in a place set apart for the purpose near their town. The inhabitants of the country above Meroë had various methods of paying respect to their deceased friends. Some threw their bodies into the river, thinking that the most honourable sepulchre. Others kept them in their houses in niches, thinking that their children would be stimulated to virtuous deeds by the sight of their ancestors; and that grown people, by the same objects, would retain their parents in their memories. Others put their dead bodies into coffins of earthenware, and buried them near their temples. To swear with their hand laid upon a corpse, was their most sacred and inviolable oath.

FUNERAL CEREMONIES OF THE CHINESE.—The funeral ceremonies are considered by the Chinese as the most important of any. A few moments after a person has expired, he is dressed out in his richest attire, and adorned with every badge of his dignity; after which he is placed in the coffin. The preparation of a coffin, in which his body may be inclosed after death, is one of the chief objects of attention to a Chinese during his life, and great expense is often thrown away upon it; insomuch that the poor will give all they are worth, and the rich expend one thousand crowns; nay, a son will sell himself for a slave, to purchase a coffin for his father. Sometimes the coffin, when purchased with all this labour and expense, will remain twenty years useless in the family; but it is considered as the most valuable piece of furniture in his possession. The manner of interment is as follows:—First, they sprinkle some lime in the bottom of the coffin; then they lay the body in it, taking care to place the head on a pillow, and to add a great deal of cotton, that it may remain steady. The body remains thus exposed seven days; but the time may be reduced to three, if any weighty reason makes it necessary; and, during this interval, all the relations and friends, who are purposely invited, come and pay their respects to the deceased, the nearest relations remaining in the house. The coffin is exposed in the hall of ceremony, which is then hung with white, but some pieces of black or violet-coloured silk are here and there interspersed, as well as some other ornaments of mourning. Before the coffin is placed a table, on which stands the image of the deceased, or a carved ornament inscribed with his name; and these are always accompanied with flowers, perfumes, and lighted wax candles. In the mean time those who enter the hall salute the deceased, as if still in life. They prostrate themselves before the table, and knock their foreheads several times against the earth; after

which they place on the table some perfumes and wax candles. Their salutations are returned by the eldest son, accompanied by his brothers. The latter come forth from behind a curtain, which hangs on one side of the coffin, creeping along the ground until they reach the spot where those stand whom they are going to salute; after which, they return without rising up. The women are also concealed behind the same curtain, from whence they every now and then send forth dismal cries.

The funeral procession at last commences. A troop of men march in a file, carrying different figures made of pasteboard, and representing slaves, lions, tigers, horses, &c. Others follow, marching in two files; some of whom carry standards, some flags, or censers filled with perfumes; while melancholy and plaintive airs are played by others, on musical instruments. These musicians immediately precede the coffin, which is covered with a canopy, in form of a dome, of violet-coloured silk: its four corners are ornamented with tufts of white silk, neatly embroidered, and covered at the top with net-work. The coffin is placed on the bottom of this machine, and is carried by sixty-four men. The eldest son, clothed in a frock of canvass, having his body bent, and leaning on a staff, follows near the coffin; and behind him his brothers and nephews, but none of them clothed in canvass. Then come the relations and friends, all clad in mourning, and followed by a great number of chairs, covered with white stuff, containing the wives and female slaves of the deceased. These make great show of sorrow, by doleful, yet methodical cries. When they arrive at the burying-place, the coffin is deposited in a tomb appropriated for it, not far from which there are tables arranged in different halls, on which the assistants are entertained with great splendour. The entertainment is sometimes followed by fresh marks of homage to the corpse; but these are often changed into thanks to the eldest son, who, however, answers only by signs. But if the deceased was a grandee of the empire, a certain number of his relations do not leave the tomb for a month or two; but reside in apartments provided for them, and every day renew their marks of grief, with the children of the deceased. The magnificence of these funeral ceremonies is proportioned to the wealth or dignity of the deceased. That of one of the brothers of the emperor, was attended by sixteen thousand people, each of whom had a particular office assigned him relating to the ceremony. Mourning continues in China for three years; during all which time they must abstain from flesh and wine, nor can they assist at any entertainment, or attend any public assembly. At first they are not even permitted to go abroad; and when they do so, they are carried in a chair, covered with a white cloth.

Sometimes the filial piety of the Chinese is carried to such a length, that they preserve the bodies of their fathers in their houses for three or four years, and impose upon themselves a great number of other duties, using no other seat during the day, but a stool covered with a white serge, and no other bed but a plain mat made of reeds, which is placed near the coffin.

FUNERAL AND MARRIAGE CEREMONIES OF THE DAJAK-KESE INHABITANTS OF BORNEO.—The corpse is placed in a coffin, and remains in the house till the son, the father, or the nearest of blood, can procure or purchase a slave, who is beheaded at the time that the corpse is burnt, in order that he may become the slave of the deceased in the next world. The ashes of the deceased are then placed in an earthen urn, on which various figures are exhibited; and the head of the slave is dried, and prepared in a peculiar manner with camphor and drugs, and deposited near it. It is said that this practice often induces them to purchase a slave guilty of some capital crime, at five-fold his value, in order that they may be able to put him to death on such occasions.

Marriage Ceremonies.—Nobody can be permitted to marry till he can present a human head of some other tribe to his proposed bride, in which case she is not permitted to refuse him. It is not, however, necessary that this should be obtained entirely by his own personal prowess. When a person is determined to go a head-hunting, as it is often a very dangerous service, he consults with his friends and acquaintances, who frequently accompany him, or send their slaves along with him. The head-hunter then proceeds with his party in the most cautious manner to the vicinity of the villages of another tribe, and lies in ambush till they surprise some heedless unsuspecting wretch, who is instantly decapitated. Sometimes, too, they surprise a solitary fisherman in a river, or on the shore, who undergoes the same fate. When the hunter returns, the whole village is filled with joy, and old and young, men and women, hurry out to meet him, and conduct him with the sound of brassen cymbals, dancing in long lines to the house of the female he admires, whose family likewise come out to greet him with dances, provide him a seat, and give him meat and drink. He still holds the bloody head in his hand, and puts part of the food into its mouth, after which, the females of the family receive the head from him, which they hang up to the ceiling over the door.

If a man's wife die, he is not permitted to make proposals of marriage to another, till he has provided another head of a different tribe, as if to revenge the death of his deceased

wife. The heads procured in this manner, they preserve with great care, and sometimes consult in divination. The religious opinions connected with this practice, are by no means correctly understood. Some assert, that they believe that every person whom a man kills in this world, becomes his slave in the next. The *Idaan*, it is said, think that the entrance into paradise is over a long tree, which serves for a bridge, over which it is impossible to pass without the assistance of a slave slain in this world.

The practice of stealing heads causes frequent wars among the different tribes of the *Idaan*. Many persons never can obtain a head, in which case they are generally despised by the warriors and the women. To such a height is it carried, however, that a person who had obtained eleven heads, has been seen by Mr. Burn; and he pointed out his son, a young lad, who had procured three.

ANCIENT MODES OF MOURNING.—Amongst the ancient Jews, on the death of their relations or intimate friends, mourning was expressed by weeping, tearing their clothes, smiting their breasts, or lacerating them with their nails, pulling or cutting off their hair and beards, walking softly, i. e. barefoot, lying upon the ground, fasting, or eating upon the ground. They kept themselves close shut up in their houses, covered their faces, and abstained from all work, even reading the law, and saying their usual prayers. They neither dressed themselves, nor made their beds, nor cut their nails, nor went into the bath, nor saluted any body. The time of mourning was generally seven days, less or more, according to circumstances, but thirty days were thought sufficient upon the severest occasions. The different periods of the time of mourning required different degrees of grief, and different tokens of it.

The Greeks, on the death of their friends, shewed their sorrow by secluding themselves from all gaiety, entertainments, games, public solemnities, wine, and music. They sat in gloomy and solitary places, stripped themselves of all external ornaments, put on a coarse black stuff by way of mourning, tore their hair, shaved their heads, rolled themselves in the dust and mire, sprinkled ashes on their heads, smote their breasts with their palms, tore their faces, and frequently cried out with a lamentable voice and drawling tone. At the funerals of soldiers, their fellow soldiers, as a testimony of their affliction, held their shields, their spears, and the rest of their armour, inverted.

The tokens of private grief among the Romans, were the same as those among the Greeks. Black or dark brown were the colours of the mourning habits worn by the men; they were

also common to the women. The mourning of the emperors at first was black. In the time of Augustus, the women wore white veils, and the rest of their dress was black. From the time of Domitian, they wore nothing but white habits, without any ornaments of gold, jewels, or pearls. The men let their hair and beards grow, and wore no wreaths of flowers on their heads, while the days of mourning continued. The longest time of mourning was ten months: this was Numa's establishment, and took in his whole year. For a widow to marry during this time, was infamous. Mourning was not used for children who died under three years of age. From this age to ten, they mourned as many months as the child was years old. A remarkable victory, or other happy event, occasioned the shortening of the time of mourning. The birth of a child, or the attainment of any remarkable honour in the family, certain feasts in honour of the gods, or the consecration of a temple, had the same effect. After the defeat at Cannæ, the commonwealth decreed that mourning should not be worn for more than thirty days, that the loss might be forgot as soon as possible. When public magistrates died, or persons of great note, also when any remarkable calamity happened, all public meetings were intermitted, the schools of exercise, baths, shops, temples, and all places of concourse, were shut up, and the whole city put on a face of sorrow; the senators laid aside the *laticlave*, and the consuls sat in a lower seat than ordinary. This was the custom of Athens also, and was observed upon the death of Socrates, when the fickle Athenians became sensible of the calamity their state had suffered in the loss of that great and virtuous man.

The modes of mourning differ in various countries, as well as the colours used for that end. In Europe, the ordinary colour for mourning is black; in China, it is white; in Turkey, blue or violet; in Egypt, yellow; in Ethiopia, brown. White obtained formerly in Castile, on the death of their princes. Herrera observes, that the last time it was used was in 1498, at the death of prince John. Each people assign their reasons for the particular colour of their mourning: white is supposed to denote purity; yellow, that death is the end of human hopes, in regard that leaves when they fall, and flowers when they fade, become yellow; brown denotes the earth, whither the dead return; black, the privation of light; blue expresses the happiness which it is hoped the deceased does enjoy; and purple or violet, sorrow on the one side, and hope on the other, as being a mixture of black and blue.

FEASTS AMONG THE ANCIENTS OF VARIOUS NATIONS.—All nations, whether savage or civilized, have regarded the pleasures of the table as the occasion of the most agreeable

society. This species of enjoyment (abstracted from its susceptibility of abuse) makes but one family of all that it brings together. It levels the distinctions introduced by policy or prejudice, and disposes men to regard one another as brethren. Here people feel the equality established by nature; here they forget the evils of life; extinguish their animosities, and drop their enmities. For this reason Aristotle considers as a breach of the social principle, that custom of the Egyptians of eating apart, and praises the convivial repasts established by Minos and Lycurgus.

We learn from Herodotus, that the ancients had neither cups nor bowls at their feasts, but that they drank out of little horns tipped with silver or gold. The Greeks and Romans kept a domestic, for the purpose of reading during their meals and feasts. Sometimes the chief of the family himself performed the office of reader; and history informs us, that the Emperor Severus often read while his family ate. The time of reading was generally at supper; and guests were invited to a reading as they are now-a-days to play at cards.

The Greeks, in their flourishing times, did not profane, (according to their own expression) the holiness of the table, but rather adorned it with ingenious and elegant conversation: they proposed moral topics, of which Plutarch has preserved a collection. Heroes rarely assembled convivially, without bringing affairs of consequence into discourse, or deliberating upon those that regarded either present events or future contingencies. The Scythians, while at meat, used to make the strings of their bows resound, lest their warlike virtues might be enfeebled or lost in the season of pleasure. People of rank among the Rhodians, by a fundamental law of the state, were obliged to dine daily with those who had the management of affairs, in order to deliberate with them concerning such things as were necessary or useful for the country; and on this account the principal ministers of the kingdom were obliged to keep open table for all who could be of use to the state. The Persians also generally deliberated on business at table, but never determined, or put their determinations in execution, except in the morning before eating.

Among the Romans, the place where they supped was generally the vestibule, that a more retired part of the house might not encourage licentiousness and disorder. There were several laws that restricted their meals to these vestibules. When luxury reigned in Rome, they had superb halls for their entertainments. Lucullus had many, each of which bore the name of some deity; and this name was a mark which indicated to the servants the expense of the entertainment. The expense of a supper in Lucullus's hall of Apollo, amounted to fifty thousand drachmas. Singers, dancers, musicians, stage-play-

ers, jesters, and buffoons, were brought into these halls to amuse the guests.

Plutarch informs us, that Cæsar, after his triumphs, treated the Roman people at twenty-two thousand tables; and by calculation it would seem, that there were at these tables upwards of two hundred thousand persons. The hall in which Nero feasted, by the circular motion of its walls and ceiling, imitated the revolutions of the heavens, and represented the different seasons of the year, changing at every course, and showering down flowers and perfumes on the guests. The Romans did not, as we do, use but one table at their feasts; they had generally two: the first was for the service of animal food, which was afterwards removed, and another introduced with fruits; at this last they sung, and poured out their libations. The Greeks and eastern nations had the same custom, and even the Jews in their solemn feasts, and at sacrifices. The Romans, in the time of Nero, had tables made of citron-wood brought from Mauritania; they were varnished with purple and gold. Dion Cassius affirms, that Seneca had five hundred of these, which he made use of one after another; and Tertullian tells us, that Cicero had but one. The Romans chose the king of the feast by a throw of the dice. At the conclusion of the feast they drank out of a large cup, as often as there were letters in the names of their mistresses.

Feasting seems to have been the chief delight of the Britons, Germans, Gauls, and all the other Celtic nations; in which they indulged themselves to the utmost, as often as they had opportunity. "Among these nations (says M. Pellontier, in his *Hist. Celt.* lib. ii. c. 12. p. 463.) there is no public assembly, either for civil or religious purposes, duly held; no birth-day, marriage, or funeral, properly celebrated; no treaty of peace or alliance rightly cemented,—without a great feast." When the Germans, says Tacitus, wanted to reconcile enemies, to make alliances, to name chiefs, or to treat of war and peace, it was during the repast that they took counsel; a time in which the mind is most open to the impressions of simple truths, or most easily animated to great attempts. These artless people, during the conviviality of the feast, spoke without disguise. Next day they weighed the counsels of the former evening: they deliberated at a time when they were not disposed to feign, and took their resolution when they were least liable to be deceived. It was by frequent entertainments of this kind, that the great men or chieftains gained the affections and rewarded the services of their followers; and those who made the greatest feasts were sure to be most popular, and to have the greatest retinue. These feasts, in which plenty was more regarded than elegance, lasted commonly several days, and the guests seldom retired until they

had consumed all the provisions and exhausted all the liquors.

Athenæus describes an entertainment that was given by Arcamnes, a very wealthy prince of Gaul, which continued a whole year without interruption, and at which all the people of Gaul, and even all strangers who passed through that country, were made welcome. At these feasts they sometimes consulted about the most important affairs of state, and formed resolutions relating to peace and war; imagining that men spoke their real sentiments with the greatest freedom, and were apt to form the boldest designs, when their spirits were exhilarated with the pleasures of the table. The conversation at these entertainments very frequently turned on the great exploits, which the guests themselves, or their ancestors, had performed in war; which sometimes occasioned quarrels, and even bloodshed. It was at a feast that the two illustrious British princes, Carbar and Oscar, quarrelled about their own bravery and that of their ancestors, and fell by mutual wounds.—*Ossian*, vol. ii. p. 8, &c.

As to the drink used at those feasts, particularly in Britain, it seems probable, that before the introduction of agriculture into the island, mead, or honey diluted with water, was the only strong liquor known to its inhabitants, as it was to many other ancient nations in the same circumstances. This continued to be a favourite beverage among the ancient Britons and their posterity, long after they had become acquainted with other liquors, (See *Mead*.) After the introduction of agriculture, ale or beer became the most general drink of all the British nations who practised that art, as it had long been of all the Celtic people on the continent, (See *Ale*.) If the Phœnicians or Greeks imported any wine into Britain, it was only in very small quantities; that liquor being very little known in this island before it was conquered by the Romans. The drinking vessels of the Gauls, Britons, and other Celtic nations, were for the most part made of the horns of oxen and other animals; but those of the Caledonians consisted of large shells, which are still used by some of their posterity in the Highlands of Scotland.

The dishes in which the meat was served up were either of wood or earthenware, or a kind of baskets made of osiers. These last were most used by the Britons, as they very much excelled in the art of making them, both for their own use and for exportation. The guests sat in a circle upon the ground, with a little hay, grass, or the skin of some animal, under them. A low table or stool was set before each person, with the portion of meat allotted to him upon it. In this distribution, they never neglected to set the largest and best pieces before those who were most distinguished for their rank,

their exploits, or their riches. Every guest took the meat set before him in his hands, and, tearing it with his teeth, fed upon it in the best manner he could. If any one found difficulty in separating any part of his meat with his hands and teeth, he made use of a large knife, that lay in a particular place for the benefit of the whole company. Servants, or young boys and girls, the children of the family, stood behind the guests, ready to help them to drink, or any thing they wanted.

As the ancient Britons greatly excelled, and very much delighted in, music, all their feasts were accompanied with the joys of song, and the music of harps. In the words of Ossian, (vol. ii. p. 9, &c.) "whenever the feast of shells is prepared, the songs of bards arise. The voice of sprightly mirth is heard. The trembling harps of joy are strung. They sing the battles of heroes, or the heaving breasts of love." Some of the poems of that illustrious British bard appear to have been composed in order to be sung by the hundred bards of Fingal, at the feasts of Selma, (see vol. i. p. 87, 209.) Many of the songs of the bards, which were sung and played at the feasts of the ancient Britons, were of a grave and solemn strain, celebrating the brave actions of the guests, or of the heroes of other times; but these were sometimes intermixed with sprightly and cheerful airs, to which the youth of both sexes danced. It has been observed by some authors, that no nation comes near the English in the magnificence of their feasts. Those made at our coronations, instalments, consecrations, &c. transcend the belief of foreigners; and yet it is doubted whether those now in use are comparable to the feasts of former ages.

William the Conqueror, after he was peaceably settled on the throne of England, sent agents into different countries, to collect the most admired and rare dishes for his table; by which means, says John of Salisbury, this island, which is naturally productive of plenty and variety of provisions, was overflowed with every thing that could inflame a luxurious appetite. The same writer tells us, that he was present at an entertainment which lasted from three p. m. to midnight, at which delicacies were served up, which had been brought from Constantinople, Babylon, Alexandria, Palestine, Tripoli, Syria, and Phœnicia. These delicacies were doubtless very expensive. Thomas Becket (says his historian Fitz-Stephen) gave £5, equivalent to £75 at present, for one dish of eels. The sumptuous entertainments which the kings of England gave to their nobles and prelates, at the festivals of Christmas, Easter, and Whitsuntide, in which they spent a great part of their revenues, contributed very much to diffuse a taste for profuse and expensive banqueting. It was natural for a proud



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ANCIENT PERSIAN SOLDIERS.

and wealthy baron to imitate, in his own castle, the entertainments he had seen in the palace of his prince. Many of the clergy, too, both seculars and regulars, being very rich, kept excellent tables.

The monks of St. Swithin's, at Winchester, made a formal complaint to Henry II. against their abbot, for taking away three of the 13 dishes they used to have every day at dinner. The monks of Canterbury were still more luxurious: for they had at least 17 dishes every day, besides a dessert; and these dishes were dressed with spiceries and sauces, which excited the appetite as well as pleased the taste. Great men had some kinds of provisions at their tables, that are not now to be found in Britain.

When Henry II. entertained his own court, the great officers of his army, with all the kings and great men of Ireland, in Dublin, at the feast of Christmas, A. D. 1171, the Irish princes and chieftains were quite astonished at the profusion and variety of provisions which they beheld, and were with difficulty prevailed upon by Henry to eat the flesh of cranes, a kind of food to which they had not been accustomed. In the remaining monuments of this period, we meet with the names of several dishes, as *dellegrout*, *maupigyrnum*, *karumpie*, &c. the composition of which is now unknown.

The coronation feast of Edward III. cost £2835. 18s. 2d. equivalent to about £40,000 of our money. At the installation of Ralph, abbot of St. Augustine, Canterbury, A. D. 1309, 6000 guests were entertained with a dinner, consisting of 3000 dishes, which cost £287. 5s. equal in value to £4300 in our times. "It would require a long treatise (says Matthew Paris) to describe the astonishing splendour, magnificence, and festivity, with which the nuptials of Richard Earl of Cornwall, and Cincia daughter of Raymund Earl of Provence, were celebrated at London, A. D. 1243. To give the reader some idea of it, in a few words, above 30,000 dishes were served up at the marriage dinner."

The nuptials of Alexander III. of Scotland, and the princess Margaret of England, were solemnized at York, A. D. 1251, with still greater pomp and profusion. "If I attempted (says M. Paris) to display all the grandeur of this solemnity,—the numbers of the noble and illustrious guests,—the richness and variety of the dresses,—the sumptuousness of the feasts,—the multitudes of the minstrels, mimics, and others whose business it was to amuse and divert the company, those of my readers who were not present, would imagine that I was imposing upon their credulity. The following particular will enable them to form a judgment of the whole. The archbishop of York made the King of England a present of 60 fat oxen; which made only one article of provision for the

marriage feast, and were all consumed at that entertainment. The marriage feast of Henry IV. and his queen, Jane of Navarre, consisted of six courses; three of flesh and fowl, and three of fish. All these courses were accompanied and adorned with *suttleties*, as they were called. These *suttleties* were figures in pastry, of men, women, beasts, birds, &c. placed on the table, to be admired, but not touched. Each figure had a label affixed to it, containing some wise or witty saying, suited to the occasion of the feast, which was the reason they were called *suttleties*."

The installation feast of George Neville, archbishop of York, and chancellor of England, exceeded all others in splendour and expense, and in the number and quality of the guests. The reader may form some idea of this enormous feast, from the following list of provisions prepared for it. In wheat, 300 quarters; in ale, 300 tuns; in wine, 100 tuns; in yprocasse pipes, 1; in oxen, 104; in wild bulls, 6; in muttuns, 1000; in veals, 304; in porks, 304; in swans, 400; in geese, 2000; in capons, 1000; in pigs, 2000; in plovers, 400; in quails, 1200; in fowls called rees, 2400; in peacocks, 104; in mallards and teals, 4000; in cranes, 204; in kids, 204; in chickens, 2000; in pigeons, 2000; in conies 4000; in bitterns, 204; in heronshaws, 400; in pheasants, 200; in partridges, 500; in woodcocks, 400; in curlews, 100; in egritis, 1000; in stags, bucks, and roes, 500 and more; in pasties of venison, cold, 4000; in parted dishes of jellies, 1000; in plain dishes of jellies, 3000; in cold tarts, baked, 4000; in cold custards, baked, 3000; in hot pasties of venison, 1500; in hot custards, 2000; in pikes and breams, 308; in porpoises and seals, 12; spices, sugared delicates, and wafers, plenty. No turkeys are mentioned in this enormous bill of fare, because they were not then known in England. Cranes, heronshaws, porpoises, and seals, are seldom seen at modern entertainments. One of the most expensive singularities attending the royal feasts in those days, consisted in what they called *Intermeats*. These were representations of battles, sieges, &c. introduced between the courses, for the amusement of the guests. The French excelled in exhibitions of this kind. At a dinner given by Charles V. of France to the emperor Charles IV. A. D. 1378, the following intermeat was exhibited: a ship, with masts, sails, and rigging, was seen first; she had for colours the arms of the city of Jerusalem: Godfrey of Bouillon appeared upon deck, accompanied by several knights armed cap-a-pié: the ship advanced into the middle of the hall, without the machine which moved it being perceptible. Then the city of Jerusalem appeared, with all its towers lined with Saracens. The ship approached the city; the Christians landed, and began to assault, while the besieged made a good defence: several scaling-

ladders were thrown down; but at length the city was taken. Intermeats at ordinary banquets consisted of certain delicate dishes, introduced between the courses, and designed rather for gratifying the taste, than for satisfying hunger. At those feasts, besides ale and cider, there were great quantities of wine of various kinds. Of these, a poet who wrote in the fourteenth century, gives an ample enumeration; wherein he mentions yprocrasse, malespine, algrade, garnade, and other kinds now hardly known. Some of these liquors, as yprocrasse, pyment, and claret, were compounded of wine, honey, and spices, of different kinds, and in different proportions.

The chapter concludes with the **FEAST OF LANTERNS**.—In China, this is a celebrated festival, held from the thirteenth to the sixteenth day of the first month; so called from the immense number of lanterns hung out of the houses and streets; which, it is said, is no less than two hundred millions. On this day are exposed lanterns of all prices, whereof some are said to cost two thousand crowns. Some of their grandees retrench somewhat every day out of the regular expenses of their table, dress, equipage, &c. to appear the more magnificent in their lanterns. They are adorned with gilding, sculpture, painting, japanning, &c. and their size is extravagant; some being from twenty-five to thirty feet diameter, representing halls and chambers. Two or three such machines together would make handsome houses; so that in China they are able to eat, lodge, receive visits, hold balls, and act plays, in a lantern. To illuminate them, they light up in them an incredible number of torches or lamps, which at a distance have a beautiful effect. In these they exhibit various kinds of shows, to divert the people. Besides these enormous lanterns, there is a multitude of smaller ones, each about four feet high, and one and a half broad.

CHAP. LXII.

CURIOSITIES RESPECTING THE CUSTOMS OF MANKIND.—
(Continued.)

Origin of the Sheriff's counting Hobnails—Origin of the Order of the Garter—Origin and History of the Claim and Allowance of the 'Benefit of Clergy' in Criminal Convictions—Curious Tenures—The Origin of May Poles and Garlands—Curious Custom at Oakham—Curious Practice in North Holland.

ORIGIN OF THE SHERIFF'S COUNTING HOBNAILES.—This is not an absurd custom of antiquity, such as nobody knows when it begun, or why it is continued; but it originated from the following circumstances:—

In former times, when money was very scarce, and when we had no larger coin than a penny, the reserved rents or grants of lands or tenements, especially small ones, were usually paid in something that had a reference to the nature of the thing granted, or the occupation of the grantee.

The two following extracts from records in the Exchequer with the translation, will clear up the point.

“Walter de Brun Mareschallus, de Stranda, redit compotum de sex femis equorum, pro habenda quadam placea in Parochia St. Clementis, ad fabrica quam ibidem locandam.”—*Mag. Rot. 19. Henry III.*

“Walter Mareschallus, ad Crucem Lapideam, redit sex ferra equorum cum clavibus, pro quadam fabrica quam de Rege tenet in capite ex opposito crucis lapidea.”—*Memor. 1. Edward I.*

“Walter le Brun, Mareshall, or farrier, of the Strand, renders six horse-shoes, to have a certain place in the parish of St. Clement's, to build a forge there.”—*Great Rolls of the 19th Henry III.*

“Walter Mareshal, or the farrier at the Stone Cross, renders six horse-shoes with their nails, for (or as a reserved rent) a certain forge, opposite to the stone cross, which he holds of the king in capite.”—*Memoranda Rolls in the Exchequer of the first year of King Edward the First.*

The first of these points out the beginning, as well as the reason, of the payment of these horse-shoes and nails; for it was to have a piece of ground to build a forge on, therefore that must be the first payment. The nineteenth year of Henry the Third falls in with 1234, now five hundred and eighty-eight years ago. In process of time, this piece of ground, and

buildings on it, came to the mayor and citizens of London; and they, by the sheriffs, have continued to render them into the Exchequer annually to this day.

The spot where the stone cross once stood had afterwards a Maypole erected on it, which many now living can well remember.

ORIGIN OF THE ORDER OF THE GARTER.—This is variously related by historians. The common and not improbable account is, that the Countess of Salisbury, happening at a ball to drop her garter, the King took it up, and presented it to her in these words, "*Honi soit qui mal y pense*;" i. e. Evil to him that evil thinks. This accident gave rise to the order and the motto; it being the spirit of the times to mix love and war together. In the original statutes, however, there is not the least hint of allusion to such a circumstance, farther than is conveyed in the motto.—Camden, Fern, &c. take the order to have been instituted on occasion of the victory obtained by Edward over the French, at the battle of Cressy. That prince, says some historians, ordered his garter to be displayed as a signal of battle; in commemoration whereof, he made a garter the principal ornament of the order erected in memory of this signal victory, and the symbol of this indissoluble union of the knights. And they account for the motto, that king Edward having laid claim to the kingdom of France, denounced shame and defiance upon him that should dare to *think amiss* of the just enterprise he had undertaken for recovering his lawful rights to that crown; and that the bravery of those knights whom he had elected into this order was such as would enable him to maintain the quarrel against those that thought ill of it. This interpretation, however, appears to be rather forced.—A still more ancient origin of this order is given in Rostel's Chronicle, lib. vi. quoted by Granger, in the Supplement to his Biographical History: viz. that it was devised by Richard I. at the siege of Acre, when he caused twenty-six knights, who firmly stood by him, to wear thongs of blue leather about their legs; and that it was revived and perfected in the nineteenth year of Edward III.

ORIGIN AND HISTORY OF THE CLAIM AND ALLOWANCE OF THE 'BENEFIT OF CLERGY' IN CRIMINAL CONVICTIONS.

The following learned dissertation is extracted from 'Chitty's Practical Treatise on the Criminal Law.'

"By far the most important circumstance intervening between conviction and judgment, is the claim and allowance of the *Benefit of Clergy*, in those cases where it is by law to be granted. It is of course claimed immediately before judgment

at the assizes. This is one of the most singular relics of old superstition, and certainly the most important. That, by a mere form, without the shadow of existing reason to support it, the severity of the common law should be tempered, may seem strange to those who have been accustomed to regard our criminal law as a regular fabric, not only attaining great practical benefit, but built upon solid and consistent principles. The *Benefit of Clergy* is, no doubt, of great practical advantage, compared to the dreadful list of offences which would otherwise be punished as capital; but it would be well worthy of an enlightened age to forsake such a subterfuge, and at once, without resorting to it, to apportion the degree of suffering to the atrocity and the danger of the crimes.

“The history of this singular mode of pardon, if so it can be termed, is both curious and instructive. In the early periods of European civilization, after the final destruction of the Roman empire, the church obtained an influence in the political affairs of nations, which threw a peculiar colouring over their original institutions. Monarchs who were desirous of atoning for atrocious offences, or of obtaining the sanction of heaven to their projects of ambition, were easily persuaded to confer immunities on the clergy, whom they regarded as the vicegerents of God. Presuming on these favours, that aspiring body soon began to claim as a right what had been originally conferred as a boon, and to found their demand to civil exemptions on a divine and indefeasible charter, derived from the text of scripture, “Touch not mine anointed, and do my prophets no harm.” It need exceed no surprise that they were anxious to take advantage of their dominion over the conscience, to exempt themselves from the usual consequences of crime. To the priests, impunity was a privilege of no inconsiderable value. And so successful was the pious zeal to shield those who were dedicated to religion from the consequences of any breach of temporal enactments, that in several countries they obtained complete exemption from all civil liabilities, and declared themselves responsible only to the pope and his ecclesiastical ministers. They erected themselves into an independent community, and even laid the temporal authorities under subjection. Nobles were intimidated into vast pecuniary benefactions, and princes trembled at the terrors of spiritual denunciation. In England, however, this authority was always comparatively feeble. The complete exemption of the clergy from secular punishments, though often claimed, was never universally admitted: for repeated objections were made to the demand of the bishop and ordinary to have the clerks remitted to them as soon as they were indicted. At length, however, it was finally settled in the reign of Henry VI. that the prisoner should first be arraigned,

and might then claim the *Benefit of the Clergy* as an excuse for pleading, or might demand it after conviction: and the latter of these courses has been almost invariably adopted, to allow the prisoner the chance of a verdict of acquittal.

“But if the privileges of the church were less dangerous in England than on the continent, they soon became more extensive. They not only embraced every order of clergymen, but were claimed for every subordinate officer of religious houses, with the numerous classes of their retainers. And so liberal was the application of these dangerous benefits, that, at length, every one who in those days of ignorance was able to read, though not even initiated in holy orders, began to demand them, such reading being deemed evidence of his clerical profession. The privileges of the clergy were recognized and confirmed by statute in the reign of Edward the Third. It was then enacted, that all manner of clerks, secular as well as religious, should enjoy the privileges of holy church for all treasons or felonies except those immediately affecting his majesty. To the advantage of this provision, all who could read were admitted. But as learning became more common, this extensive interpretation was found so injurious to the security of social life, that the legislature, notwithstanding the opposition of the church, were compelled to afford a partial remedy.

“In the reign of Henry the Seventh, a distinction was drawn between persons actually in holy orders, and those who, in other respects secular, were able to read; by which the latter were only allowed the benefit of their learning once, and, on receiving it, to be branded in the left thumb with a hot iron, in order to afford evidence against them on any future occasion. The church seems to have lost ground in the succeeding reign, probably in consequence of the separation of England from the sway of the Roman pontiff; for all persons, though actually in orders, were rendered liable to be branded, in the same way as the learned class of laymen. But, in the time of Edward the Sixth, the clergy were restored to all the rights of which they were deprived by his predecessor, except as to certain atrocious crimes, which it became necessary more uniformly to punish. At the same time, some of the more enormous evils attendant on this general impunity were done away. Murder, poisoning, burglary, highway-robbery, and sacrilege, were excepted from all that privilege which was confirmed as to inferior offences. But peers of the realm, for the first offence were to be discharged, in every case, except murder and poisoning, even though unable to read.

“But here we must pause, before we proceed to follow the gradual improvement of this privilege, to inquire what was originally done with an offender to whom it was allowed by those ecclesiastical authorities who claimed the right of

judging him, and in what manner the power of the church in this respect was ultimately destroyed. It appears, that after a layman was burnt in the hand, a clerk discharged on reading, or a peer without either burning or penalty, he was delivered to the ordinary, to be dealt with according to the ecclesiastical canons. Upon this, the clerical authorities instituted a kind of purgation, the real object of which was to make him appear innocent, who had already been shewn to be guilty, and to restore him to all those capacities of which his conviction had deprived him. To effect this, the party himself was required to make oath of his innocence, though before he might have confessed himself guilty. Then twelve compurgators were called to testify their belief in the falsehood of the charges. Afterwards he brought forward witnesses completely to establish that innocence, of which he had induced so weighty a presumption. Finally, it was the office of the jury to acquit him; and they seldom failed in their duty. If, however, from any singular circumstance, they agreed in the justice of the conviction, the culprit was degraded, and compelled to do penance. As this seldom occurred, and the most daring perjuries were thus perpetually committed, the courts of common law were soon aroused to abridge the power of these clerical tribunals. They, therefore, sometimes delivered over the privileged of felony, when his guilt was very atrocious, without allowing him to make purgation; the effect of which proceedings was, his perpetual imprisonment, and incapacity to acquire personal or to enjoy real estate, unless released by his majesty's pardon. But the severity of this proceeding almost rendered it useless; and it became absolutely necessary for the legislature to interfere, in order to prevent the contemptible perjuries which this absurd ceremony produced under the sanction and pretence of religion. This desirable object was effected in the reign of Elizabeth; and the party, after being allowed his clergy, and burnt in the hand, was to be discharged without any interference of the church to annul his conviction.

“The clerical process being thus abolished, it was thought proper, at the same time, to empower the temporal judges to inflict a further punishment where they should regard it as proper. The eighteenth Elizabeth, c. vii. empowered them, therefore, to direct the convict to be imprisoned for a year or any shorter period. But the law on this subject was still in many respects imperfect. Females were still liable to the punishment of death, without any exemption, in all cases of simple felony; because, being never eligible to the clerical office, they were not included in any of the extensions of the *Benefit of Clergy*. No other proof need be adduced to shew the absurdity of the very foundations of the system. At length

it was enacted that women convicted of simple larcenies under the value 10s. should be punished with burning in the hand and whipping, exposure in the stocks, or imprisonment for any period less than a year. And in the reign of William and Mary they were admitted to all the privileges of men, in clergiable felonies, on praying the benefit of the statute; though they can only once be allowed this means of escaping. In the same reign, the punishment of burning in the hand was changed for a more visible stigma on the cheek, but was soon afterwards brought back to the original practice.

• “Hitherto all laymen except peers, who, on their conviction, were found unable to read, were liable to suffer death for every clergiable felony. But it was at length discovered, that ignorance, instead of an aggravation, was an excuse for guilt, and that the ability to read was no extenuation of crime; and, therefore, by fifth Ann, c. vi. the idle ceremony of reading was abolished, and all those who were before entitled to clergy on reading, were now to be admitted without any such form to its benefits. At the same time it was sensibly felt that the branding, which had dwindled into a mere form, and the year’s imprisonment which the judges were empowered to inflict, were very inadequate punishments for many clergiable offences; and, therefore, the court were authorized to commit the offenders to the house of correction for any time not less than six months nor exceeding two years, and to double it in case of escaping.

“Further alterations have since been made in the penalties consequent upon clergy. The fourth Geo. I. c. xi. and sixth Geo. I. c. xxiii. provide, that the court, on the allowance of this benefit for any larceny whether grand or petty, or other felonious theft not excluded from the statutable indulgence, may, instead of judgment of burning in case of men, and whipping in that of females, direct the offender to be transported for seven years to America, which has been since altered to any part of his majesty’s colonies. To return within the period, was, at the same time, made felony without *Benefit of Clergy*. And by several subsequent provisions, many wise alterations have been made respecting transportation, and the mode of treating offenders while under its sentence.

“At length the burning in the hand was entirely done away, and the judges were empowered to sentence the criminal, in its room, and in addition to the former penalties, to a pecuniary fine, or, except in the case of manslaughter, to private whipping, not more than thrice to be inflicted, in the presence of three witnesses. Provisions were at the same time made for the employment of this description of convicts in penitentiary houses, where a system of reformation might be adopted, and an experiment made how far punishment might become

conducive to its noblest and most legitimate use—the reformation and benefit of the offender. But this regulation, though applauded by Blackstone and other humane writers, after having been continued by several subsequent acts, was recently suffered to expire. It appears from these several modern regulations, that, as observed by Mr. Justice Foster, we now consider *Benefit of Clergy*, or rather the benefit of the statutes, as a relaxation of the rigour of the law, a condescension to the infirmities of the human frame, exempting offending individuals in some cases from the punishment of death, and subjecting them to milder punishment; and therefore, in the case of clergiable felonies, we now profess to measure the degree of punishment by the real enormity of the offence, and not, as the ignorance and superstition of former times suggested, by a blind respect for sacred persons or sacred functions, nor by an absurd distinction between subject and subject, originally owing to impudent pretension on one hand, and to mere fanaticism on the other.”

CURIOUS TENURES.—A farm at Broadhouse, in Langsett, in the parish of Peniston, and county of York, pays yearly to Godfrey Bosville, Esq. ‘a snow-ball at Midsummer, and a red rose at Christmas.’

William de Albermarle holds the manor of Loston, ‘by the service of finding, for our lord the king, two arrows, and one loaf of oat bread, when he should hunt in the forest of Eartmoor.’

Solomon Attefield held land at Repland and Atterton, in the county of Kent, upon condition ‘that as often as our lord the king would cross the sea, the said Solomon and his heirs ought to go along with him, to hold his head on the sea, if it was needful.’

John Compes had the manor of Finchfield given him by Edward III. for the service of ‘turning the spit at his coronation’

Geoffrey Frumbrand held sixty acres of land in Wingfield, in the county of Suffolk, by the service of paying yearly to our lord the king two white doves. John de Roches holds the manor of Winterslew, in Wiltshire, by the service that when the king should abide at Clarendon, he should go into the butlery of the king’s palace there, and draw, out of whatever vessel he chose, as much wine as should be needful for making a pitcher of claret, which he should make at the king’s expense, and that he should serve the king with a cup, and should have the vessel whence he took the wine, with all the wine then in it, together with the cup whence the king should drink the claret.

The town of Yarmouth is, by charter, bound to send the

sheriffs of Norwich a hundred herrings, which are to be baked in twenty-four pies or patties, and delivered to the lord of the manor of East Carlton, who is to convey them to the king.

At the coronation of James II. the lord of the manor of Heyden, in Essex, claimed to hold the basin and ewer to the king by virtue of one moiety, and the towel by virtue of the other moiety of the manor, whenever the king washed before dinner; but the claim was allowed only as to the towel.

The privileges of the great officers of the ancient British court, were particularly striking. Each was annually presented by the king and queen with a piece of linen and woollen cloth, besides some old clothes from the royal wardrobe. The king's riding-coat was three times a year given to the master of the mews; his caps, saddles, bits, and spurs, became the perquisite of the master of the horse; and the chamberlain appropriated to himself his old clothes and bed-quilts.

The third in rank, in the court of the Anglo-Saxon kings, was, the steward, who had a variety of perquisites, of which the following were the most remarkable:—'As much of every cask of plain ale, and as much of every cask of ale with spiceries, as he could reach with the second joint of the middle finger; and as much of every cask of mead, as he could reach with the first joint of the same finger.'

Our next article is on THE ORIGIN OF MAY POLES AND GARLANDS.—It was a custom among the ancient Britons, before they were converted to Christianity, to erect May-poles, adorned with flowers, in honour of the goddess Flora; and the dancing of milkmaids on the first of May before garlands, ornamented with flowers, is only a corruption of the ancient custom, in compliance with other rustic amusements.

The leisure days after seed-time had been chosen by our Saxon ancestors for folk-motes, or conventions of the people. It was not till after the Norman conquest that the Pagan festival of Whitsuntide fully melted into the Christian holiday of Pentecost. Its original name is Whittentide, the time of choosing the wits or wisemen to the wittenagemotte. It was consecrated to Hertha, the goddess of peace and fertility; and no quarrels might be maintained, no blood shed, during this truce of the goddess. Each village, in the absence of the baron at the assembly of the nations, enjoyed a kind of saturnalia. The vassals met upon the common green around the May-poles, where they erected a village lord, or king, as he was called, who chose his queen. He wore an oaken, and she a hawthorn wreath; and together they gave laws to the rustic

sports during these sweet days of freedom. The May-pole, then, was the English tree of liberty. How are these times of village simplicity and merriment vanished!

CURIOUS CUSTOM AT OAKHAM.—Oakham is remarkable for the following curious custom. Every peer of the realm, the first time he comes within the precincts, forfeits a shoe from his horse to the lord of the manor and castle, unless he agrees to redeem it with money; in which case a shoe is made according to his direction, ornamented in proportion to the sum given by way of fine, and nailed on the castle hall door. Some shoes are of curious workmanship, and stamped with the names of the donors: some are made very large, and some gilt. An ancient poet says of this county,

“Small shire that can produce to thy proportion good,
One vale of special name, one forest, and one flood.”

A CURIOUS PRACTICE IN NORTH HOLLAND.—To every house, of whatever quality, there is an artificial door, elevated near three feet above the level of the ground, and never opened but upon two occasions. When any part of the family marries, the bride and bridegroom enter the house by this door; and when either of the parties die, the corpse is carried out by the same door. Immediately after the due ceremonies are performed in either of these cases, this door is fastened up, never to turn on its hinges again, till some new event of a similar nature demands its services.



CHAP. LXIII

CURIOSITIES RESPECTING THE CUSTOMS OF MANKIND.— (Continued.)

Shrovetide—Candlemas Day—Origin of Valentine's Day—Origin of Plough Monday—New Year's Gifts—Origin of Christmas Boxes—Chiltern Hundreds—Origin of the Tern "John Bull"—Origin of the Old Adage, "If it rains on St. Swithin's Day, it will rain Forty Days afterwards"—Curfew Bell.

SHROVETIDE,—in its original meaning, signifies the time of confessing sins to a priest. *Tide* refers to time; and *shrove*, *shrive*, or *shrift*, are derived from the Saxon, and signify confession. In the earlier constitution of the church, it is ordered, “That on the week next before Lent, every

man should go to his shrift, and his shrift should shrieve him in such a manner as the deeds which he had done required."

This custom of confessing to the priest at this season, was laid aside at the Reformation.

Fitzstephen informs us, that anciently, on Shrove-Tuesday, schoolboys used to bring "cocks of the game" to their masters, and entertain themselves with cock-fighting. The masters presided at the battle, and claimed the runaway cocks as their perquisite.

The custom of throwing at cocks on this day is not of very ancient institution: it is gradually growing out of use; to which amendment of our manners, the ingenious pencil of Hogarth probably contributed.

Shrove-Tuesday is, in the north, called Fastern's E'en, because the following day is the commencement of Lent.

Shrove-Monday is also termed Collop-Monday; in the north, collops and eggs being on that day a constant dish, as on the next day the Papists take leave of flesh.

Our custom of eating pancakes on Shrove-Tuesday, was probably borrowed from the Greek church. The Russians begin their Lent always eight weeks before Easter; the first week they eat eggs, milk, cheese, and butter, and make great cheer with pancakes, and such other things.

In the Oxford almanacks, the Saturday preceding this day is termed *Festum Overum*, Egg feast.

On Shrove-Tuesday, the people in every parish throughout England were obliged, one by one, to confess their sins to their own parish priests, in their own parish churches. And that this might be done more regularly, the great bell in every parish was rung at ten o'clock, or perhaps sooner, that it might be heard by all, and that they might attend according to the custom then in use. And though we are now Protestants, yet the custom of ringing the great bell in an ancient parish church still continues, and has the name of the *pancake bell*, probably, because after the confession it was customary to dine on pancakes or fritters; and many people even now have these articles as part of their dinner on this day.

This used to be a great holiday amongst apprentices; but a contempt of old customs seems gaining ground in this country, and those, or many of them above-mentioned, will probably soon be forgotten.

Another account of the origin of frying pancakes on Shrove-Tuesday, has been given. It is said that one Simon Eyre, a shoemaker, being chosen lord-mayor of London, made a pancake feast on Shrove-Tuesday for all the apprentices in London; and from that it became a custom.

He ordered, that upon ringing of a bell in every parish, the apprentices should leave work, and shut up their shops for that day; which being ever since yearly observed, is called the pancake bell: he made them a large feast of puddings, pies, and pancakes, and what remained, when all had dined, was given to the poor: afterwards in that year (1446,) he built Leadenhall.

CANDLEMAS DAY.—This is the feast of the purification, which was formerly celebrated with many lights in churches. The custom of going in procession on Candlemas-day with lighted candles in the hand, is said to have been derived from the Romans, who went about Rome with torches, and candles *brenning* (burning) in worship of Februa, the mother of Mars. This was afterwards, by Pope Fergius, converted into the worship of our Lady, and her Son, the Lord Jesus Christ. Wheatley says, "The practice of using abundance of lights, both in churches and processions, continued in England till the second year of Edward VI. when Bishop Cranmer forbade it, by order of the Privy Council."

VALENTINE'S DAY.—Valentine was a pope, or bishop of Rome, that lived in the ninth century; who, on this day, established an annual custom of the poorer clergy drawing patrons by lots for the commenced year; and these patrons, or benefactors, were called Valentines. After his death he was canonized for a saint, and his feast-day kept on the fourteenth day of February, which was thought to be his birth-day. Mr. John Gordon, in his memoirs and account of the popes, says, "that Valentine was too good a man to be a good pope, and died forty days after his consecration, or instalment, being choked with a fish-bone."

This custom, in Britain, evidently appears to have been copied by the laity from the clergy, in the days of popery, and is a very ancient custom, being almost of a thousand years standing. The birds too are supposed to choose their mates, and pair, on this day; which, no doubt, is an additional reason to our youth of both sexes who are approaching to maturity, to write their verses, and with much ingenuity ply scissars, pen, and pencil, in honour of their selected or allotted lovers.

PLOUGH-MONDAY.—This day is held on the ninth of January, the Monday after Twelfth-day. The ploughmen, in the north country, draw a plough from door to door, and beg money for drink; from whence this took its name. Plough-day had its origin when the feudal system prevailed in this country, when the lords and barons had their lands tilled by their vassals, or tenants. The Christmas holidays terminated

on Twelfth-day, and the ploughing season for the new year commenced the first Monday after; on which day, the sockmen (as this sort of ploughmen were then called) were obliged to appear with their ploughs, &c. at a place appointed there, to have them examined, whether they were in a proper condition to perform their lord's work; for ploughs were then scarce, and it was a mark of some consequence to possess one in good order. Hence the appellation of Plough-Monday has ever since being applied to the first Monday after Twelfth-day. It is conjectured, that the system of begging money arose at a time when they could not plough the land on account of its being frozen, as watermen drag about a boat in severe frosts, and beg money, because they are then unable to ply on the river.

NEW YEAR'S GIFTS.—Nonius Marcellus refers the origin of New Year's Gifts among the Romans to Titus Tatius, king of the Sabines, who reigned at Rome conjointly with Romulus, and who, having considered as a good omen a present of some branches cut in a wood consecrated to *Strenua*, the goddess of strength, which he received on the first day of the new year, authorized this custom afterwards, and gave to these persons the name of *Strenæ*. The Romans on that day celebrated a festival in honour of Janus, and paid their respects at the same time to Juno; but they did not pass it in idleness, lest they should become indolent during the rest of the year. They sent presents to one another of figs, dates, honey, &c. to shew their friends that they wished them a happy and agreeable life. Clients, or those who were under the protection of the great, carried presents of this kind to their patrons, adding to them a small piece of silver. Under Augustus, the senate, the knights, and the people, presented such gifts to him, and in his absence deposited them in the capitol. Of the succeeding princes, some adopted this custom, and others abolished it; but it always continued among the people. The early Christians condemned it, because it appeared to be a relic of paganism, and a species of superstition; but when it began to have no other object than that of being a mark of esteem, the church ceased to disapprove of it.

PASSION, OR HOLY WEEK, the name given by several sects to the week preceding Easter. Holy Week is the name generally used by Catholics, who make a distinction between it and Passion Week, a title they apply to the week preceding—Passion Week beginning on Passion Sunday, the fifth Sunday of Lent. The Roman calendar designates the entire last fortnight of Lent as Passion-tide, all of whose services differ in

many respects from the services of the year, and even from those of the remainder of Lent. The verse, "Gloria Patri," is omitted both in the mass and breviary, and all pictures, effigies, crucifixes, and other theologic symbols are covered during the time. Holy Week, also known as Great Week, Lent Week, Week of the Holy Passion, and Penitential Week, is asserted to be of very early origin, and is usually observed with extraordinary solemnity by Catholics, who exhibit at this period many signs of melancholy, mourning, and repentance. If any ordinary Church festival fall within the week, it is postponed until after Easter. All ceremonies are conducted with rigorous simplicity, without the music, pomp, or parade so characteristic, commonly, of Roman rites. Although manual labor is no longer forbidden, it is often voluntarily relinquished; fasting is more rigorously practiced, as well as alms-giving and other acts of charity.

CHILTERN HUNDREDS.—Frequent mention is made of members of parliament accepting the Chiltern Hundreds. The following is the explanation:—

The Chiltern Hundreds are hundreds, or divisions of counties parcelled out by the wise Alfred, and now annexed to the crown; they still retain their peculiar courts.

The stewards of these courts are appointed by the Chancellor of the Exchequer; their salary is 20s. a year. As the law enacts that a member of parliament who receives a place under the Crown, may not sit, unless re-elected,—accepting the stewardship of the Chiltern Hundreds is merely a formal manner of resigning a seat, when the member wishes to be rechosen.

ORIGIN OF THE TERM "JOHN BULL."—Dr. John Bull was the first Gresham professor of music, and organist and composer to Queen Elizabeth. John, like a true Englishman, travelled for improvement; and having heard of a famous musician at St. Omer's, he placed himself under him as a novice; but a circumstance very soon convinced the master, that he was inferior to the scholar. The musician shewed John a song, which he had composed in *forty parts!* telling him at the same time, that he defied all the world to produce a person capable of adding another part to his composition. Bull desired to be left alone, and to be indulged for a short time with pen and ink. In less than three hours, he added forty parts more to the song. Upon which the Frenchman was so much surprised, that he swore in great ecstasy, he must be either the *Devil*, or *John Bull*; which has ever since been proverbial in England.

Origin of the Old Adage, "IF IT RAINS ON SAINT SWITHIN'S DAY, IT WILL RAIN FOR FORTY DAYS AFTERWARDS."

In the year 805, St. Swithin, bishop of Winchester, dying, was canonized by the then pope. He was singular in his desire to be buried in the open church-yard, and not in the chancel of the minister, as was customary with the bishops; which request was complied with: but the monks, on his being canonized, taking it into their heads that it was disagreeable for the saint to lie in the open church-yard, resolved to move his body into the choir, which was to have been done in solemn procession on the 15th of July. It rained, however, so violently on that day, and for forty days succeeding, as had hardly ever been known, which made them set aside their design, as contrary to the will of Heaven; and instead of removing the body, they shewed their veneration by erecting a chapel over his grave.

Origin of the Saying, when people speak improperly, "THAT'S A BULL."—This became a proverb from the repeated blunders of one Obadiah Bull, a lawyer of London, who lived in the reign of king Henry VII.

CURFEW BELL.—The curfew bell (called, in the low Latin of the middle ages, *ignitegium*, or *peritegium*, and in French, *couvrefew*) was a signal for all persons to extinguish their fires at a certain hour. In those ages, people made fires in their houses in a hole or pit in the centre of the floor, under an opening formed in the roof; and when the fire was burnt out, or the family went to bed, the hole was shut by a cover of wood or earth. This practice still prevails among the cottagers in some parts of Scotland, and perhaps in other parts of the kingdom. In the dark ages, when all ranks of people were turbulent, a law was almost every where established, that the fire should be extinguished at a certain time in the evening; that the cover should be put over the fire-place, and that all the family should retire to rest, or at least keep within doors. The time when this ought to be done, was signified by the ringing of a bell, called therefore the curfew bell, or *ignitegium*. This was the law of William the Conqueror, who first introduced the practice into England, and which was abolished by Henry the First, in 1100.

The ringing of the curfew bell gave rise to the Prayer Bell, as it is called, which is still retained in some Protestant countries. Pope John the Twenty-third, with a view to avert certain apprehended misfortunes which rendered his life uncomfortable, gave orders, that every person, on hearing the *ignitegium*, should repeat the *Ave Maria* three times.

When the appearance of a comet, and the dread of Turks, alarmed all Christendom, Pope Calixtus the Third increased these periodical times of prayer, by ordering the prayer bell to be rung also at noon.

CHAP. LXIV.

ANCIENT RELIGIONS.—MYSTERIES AND ORACLES.—ORIGIN OF THE HEATHEN RELIGION.

It is manifest that the first fostering of the religious spark is derived from the phenomena of the *sensible* world. The attention of man and the sense of his weakness is early awakened—yet at first, more by such phenomena as interrupt the common course of nature, and in particular by the experience of terrifying or destroying powers. He searches for the *causes* of such phenomena, and his imagination, outstripping his later-maturing understanding, ascribes them to the arbitrary activity of more powerful beings. *Fear*, so we are taught by most kinds of divine worship which are yet in a rude state, and even by a variety of those that have attained a high degree of perfection, fear has at first agitated the soul of man and produced his religious disposition, which, progressing on the way once opened, was soon directed also to the *beneficent* powers of nature, and to these with love and gratitude, as to the threatening with terror and timid prayer; but at last combining with these awful impressions that which echoes to them softly and sacredly from the innermost recesses of the heart, discerned in those unknown powers the *moral* rulers, as well as the sovereigns of nature, and upon their mysterious potency built the bold hope of *immortality*.

This adoration of objects, powers, and appearances of nature (it is called by the general appellation *feticism*, which, however, does not designate it definitely enough) is discernible in all ancient religions as the basis, and often still later, in their more refined state as the predominant form; but the objects themselves must vary according to the diversity of country and climate, of wants and customs. The storm and the thunder; the power of water and fire, in general the elements and meteors, or the fostering soil, the river that sometimes fertilizes by inundation, and sometimes produces desolation; in the smaller circle, even a running fountain, or a tree which afforded a hospitable shade or delightful fruits; and even the inferior plants; friendly and hostile animals and inanimate objects, but more than all others the sun, the source of light, fertility, and life; the moon, whose gentle majesty speaks to all hearts, and all the high luminaries of the heavens.

This veneration of the *celestial bodies* may be considered as the most elevated form of the pagan religion, because it is nobler in itself than the common Feticism, and raises the soul much

higher; and also because it has become mediately by the investigations of *astronomy*, which it occasioned, or with which it was connected, the source of far more ingenious systems, and has chiefly determined the dogmas and usages of nations, which are of historical importance.

For after a commencement was made—which was probably first done in Egypt—in investigating the courses of the celestial bodies according to the rules of art, and in seeking for a certain measure of the year and the seasons in the changing constellations, it was necessary to distinguish the various stars and groups of stars, especially those through which the apparent course of the sun and the planets passed, by particular names and fancied images, which were derived in the most natural manner from the affairs of agriculture, the phenomena of the seasons, or other terrestrial objects, that might be connected by an easy association of ideas with the constellations; according to their time or region. Figurative expressions were also selected to represent the various appearances of the heavens, as the varying remoteness and proximity of the stars among themselves and towards the sun, such as, union and separation, love and hatred, dominion and subjection, &c. By the frequent use of such expressions, their original signification, which was merely figurative, was almost inevitably forgotten, and the sign was exchanged for what was designated the earthly for the celestial.

Then those figurative expressions, taken mostly from human qualities and relations, occasioned, as was indeed already done in the common Feticism, the application of ideas which represent the active and passive state of man to the gods, and caused a succession of symbolical positions to be regarded as a series of actual events, and the histories of the gods to be formed like those of men, and by this means a *third class* of religious systems was created.

This is the *deification* of departed men. For when once the gods were brought down to men, and considered subject to human inclinations, infirmities, and destinies, when they were habitually imagined to be men who had formerly been upon earth; nothing was more natural than that *real* men also, who had distinguished themselves, perhaps by wisdom and virtue, by power and beneficence, and consequently elevated themselves above common nature, were regarded as gods or children of gods, and after their death translated to heaven, from voluntary gratitude, servile flattery, or by the mandate of rulers.

The number of deified men, however (the Grecian, and later the Roman religion excepted), has never been very great. The sound understanding of man rose against this apotheosis, and it could by no means enter into those systems of religion which were based upon philosophy and speculation.

The worship of images, or *idolatry*, in the stricter sense, prevailed more generally. We find this worship of idols associated as well with Feticism as with the veneration of deified men,

here and there almost alone predominant, and even introduced into those religions which rest upon an intellectual foundation.

If we except, however, those natural bodies, or rude products of art (as serpents, stones, and hewn pieces of wood, &c.), which are venerated by the most simple nations as fetichs, and indeed merely as religious objects rather than divine—perhaps as talismans, amulets, &c.—we find that idols, according to the principles of a prevailing national religion, were nowhere actually venerated as gods, but only as *images* of the deity. A distinguished man has justly remarked, that the name idolater is one introduced only by those who enjoy a purer religion, but an *unjust* stigma upon the heathen nations, and that never one of them would have acknowledged the validity of such an appellation in that full sense of the word. The proper dogmas—which *e. g.* admitted only *one* Jupiter, who was enthroned in Olympus—were manifestly contradictory to the divine veneration of the thousand statues of his name which adorned so many temples.

And, accordingly, it is evident that the idols were not gods, but were designed only as *representations* of the deity. Wise and deserving men also venerated these images, since a sacred meaning and a sacred object rested upon them. Soon the devotion of the multitude felt inclined to confide to them higher and miraculous powers; the priests favored this belief, because it brought authority and wealth to them—the guardians of the images—and by a natural increase of devotion, and an artfully enhanced illusion—the conversion of the sign into that which was designated, of the image into the deity, was gradually introduced among the low populace, as well as that which was found in all classes, upon which the philosopher will forbear to pronounce a too severe or *partial* sentence of condemnation.

NATIONAL RELIGION.—PRIESTS.—FABLES.

ALL the religions of the ancient paganism may be reduced to one or the other of these classes; yet their characters are nowhere to be found *unmixed*, and the distinction can be made only according to that which is predominant. But before any system whatever could have been constructed with determinate and durable forms, religion must have ceased to be a private affair; it must have been *national* property, and a *priesthood* must have existed for its preservation. Uniform notions, uniform ways of worship amongst numerous masses of men arose, and this communion became the most precious possession, the most important tie of nations. The similar experience of the inhabitants of one region concerning the influence of the *same* natural objects, the transmission of ancient tradition through all the members of a spreading family, the persuasion and instruction of individuals of *superior* minds, particularly of foreigners from civilized regions, but chiefly the labors of wise legislators and of the *priesthood* often established, and generally favored

by such legislators, and frequently arising without their assistance, effected this revolution, so remarkable in the history of man.

The appearance of these priests makes a principal epoch in the religion, and in the whole condition of men. They appear in the early twilight of history. *They* did not, however, make religion, they themselves arose rather through religion. But they cherished and brought the slumbering germ to perfection, and gave it its direction and form. By them, what was before wavering and inconstant, became determinate and durable, and presentiment was made doctrine—dream, positive truth; they preserved faith by formulas, devotion by usages, substituted coercion of conscience for freedom, and subjected the most secret thoughts to their dominion. Since now, what to the laity was merely a fugitive impression, a transient emotion, formed the principal business of their lives, they were able, easily guided or seduced by speculation and fancy, to spin out the thread of sacred tradition further, to convert the simple creeds of nature into ingenious systems, and, according to the measure of their illumination and their good will, ennoble or corrupt the sacred endowment of man. Now, *learned* religions first originated, as well as a great number of symbols and fables, whereby the religious ideas of the confessors were confined, as it were, in an enchanted circle, the natural subordinated to the positive—often stifled by it—minute distinctions between the various systems of religion effected, and their number greatly multiplied.

But it is a perception of the highest importance, and one which throws a surprising, radiant light upon the most sacred concern of man, that in all this variety, and amidst all changes, many principal traits, however, are found to be *uniform*, and the fundamental ideas *constant*. Hence results for the philosophical observer, the clearest distinction of the chaff from the grain, of the veil from the substance, and, at the same time, the interesting discernment of the most secret nature of man.

First, we see everywhere, man, although limited to the world of sense in his active and passive state, look beyond its confines with foreboding and desire, acknowledge higher, living, moral powers over the blind forces of nature, in the triumph of predominant wickedness, hope for a time of retribution, and, surrounded with the images of corruption, believe in a continuation beyond the grave.

But this divine spark in the human soul, an evidence of its higher origin, how miserably, for the most part, we see it cherished! Its excitation is the work of accident, its nourishment is unrefined, folly and deceit stifle its splendor. The sublime ideas, the lively sentiments of natural religion, the most precious boon of our race, are converted into dead formulas.

The harmony of nature proclaims *one* supreme, ruling Spirit. But the common understanding is unable to soar up to the majesty of a God, who lives in all the powers of nature, and fills

heaven and earth with his presence. Hence it is glad to admit as many gods as it knows natural powers, consequently good and bad, and also particular gods for every country, and even for every community and every house. Even if, by the instruction of solitary sages or enlightened priests, a supreme God is announced to it, still it retains the belief in *subordinate* gods, and directs confidently to *these* its supplication.

And under what image does man conceive his God? At first under *none*, or at least under no definite one, as long as he is not much engaged with him, and only on particular occasions perceives his dependence on higher powers. Yet he soon feels the want of forming clearer ideas and more definite images of the beings which he adores. He takes them from the *world of sense*, because beyond this the stroke of his spirit's wings becomes feeble; therefore he gives them mostly a *corporeal* veil; and since, in the whole province of his experience, no nobler form than that of man appears, and at the same time no worthier emblem of the divine Spirit can be found than the human, we see the idea of God in no national religion carried higher than to an enhancement of human perfection. But soon not only the superior qualities of human nature, but its restrictions and wants were also embraced in the idea of gods; even passions and vices were ascribed to them, and now they were made throughout similar to men. This *anthropomorphism* is observable in all religions. Even the ideas of the relation of the gods among themselves are borrowed from human relations, and in the conceptions of their order of rank, and of the gradations of their power, we meet mostly with an image of the civil constitution of that nation in which such conceptions prevail.

For the service of these gods, and for the extension and preservation of religious ideas, we see everywhere a priesthood instituted or forming itself, which, by this destination, exercises a power over minds, according to its principles beneficial, but in its abuse extremely dangerous. We see this class mostly enlarge and establish their power by all the expedients of an ambitious policy, aspire to a permanent guardianship over nations, not only in sacred, but also in worldly affairs; for this end surcharge religion with heterogeneous additions, veil the understanding of the people by superstition, substitute *authority* for free investigation, the terror of penal power for conviction, usurp the monopoly of the sciences, and with this the administration of the State, and even the vocation of magic, plunder the debased people at pleasure, and in a selfish manner appropriate to themselves all the advantages of civil union, without participation in its burdens. Yet priests have also produced a very beneficial effect particularly in *primitive* times; since without them nations would not have escaped barbarism at all, or not until a late period, civil societies would have been established with much more difficulty, commerce would have been less extended, the

arts and sciences less fostered, and nations would have inevitably become here the victims of anarchy, there of wild despotism.

MYSTERIES AND ORACLES.

BESIDES the prevailing national religion and the general worship of the ancients, there existed almost everywhere a *secret doctrine*, which was either communicated by priests, likewise to a small circle of selected individuals, or taught by particular inquirers as the fruit of profane philosophy. Of the first, especially, remarkable proofs appear among many small nations. We speak here of *mysteries*, which we see originate in remote antiquity, and, at that time, produce the greatest effect.

There were several kinds of mysteries, which differed widely in object and effect. Some consisted only of religious ceremonies, the mystical solemnity of which seemed adapted to proclaim a higher majesty of the god, or to fill the mind with religious awe. Other mysteries were associations of devout people, who, by particular devotional practices, or by pursuing peculiar rules of life, endeavoured to attain a higher moral perfection than that of the rest. The third and noblest kind of mysteries were those where a secret doctrine was imparted to the initiated concerning subjects to the investigation of which we are urged by a high and eternal interest, but the unveiled contemplation of which is dangerous for the common intellect. There were, however, several grades of initiation. To the inferior—where those admitted were prepared, examined, or entertained by vain delusion, as in the great *Elusianian* mysteries—many, even women and children, were able to attain; into the inner sanctuary but few were introduced. They sufficed to prevent the extinction of the beneficial flame, and always let as much light emanate from their centre into external circles, and into the whole nation, as relations and the general state of cultivation permitted.

We meet with *oracles* in the ancient religions still more generally than with mysteries, by which here not merely those sacred places are understood, where a certain god replied by some organ to the questions put to him, but in general all the means and ways which superstition has invented to arrive at the knowledge of the divine will and the future. Man is incessantly tortured with the inquiet desire to raise the impenetrable veil, which lies over his future; and inexplicable feelings are often in his mind, which he calls *forebodings*, because he supposes a secret connexion between these and a coming event. For his little person is the centre from which he considers the world. Everything exists in reference to him; he imagines that on account of his private affairs, the gods stop the machinery of nature, and that even the celestial bodies direct their courses according to his destiny. This disposition was early abused by cunning men, and, to the question, who invented soothsaying, we may without hesitation answer with Voltaire: “it was the first rogue that

met with the first blockhead." What advantage they were able to derive from this superstition did not escape the priests. Even legislators, who discerned in it an efficacious means for the direction of the multitude, favored the same, and it became a peculiar, sacred art, pursued according to fixed rules, and generally respected, to interpret the future from the constellations, the entrails of animals, the flight of birds, dreams, lots, &c.

A CURIOUS BAPTISM, which took place at DUBLIN, in the year 1807.—A Moor, a native of Mogadore, in Africa, a strict observer of the religion of Mahomet, wearing always, of course, the costume of his country, resided a few months in the above city. A family, where he occasionally visited, being about to baptize their infant, solicited the stranger to stand godfather, which was immediately consented to; and on the appointed day, he appeared splendidly arrayed in his turban and robes, at the sacred font, where, with due solemnity, he answered to the accustomed interrogatives,—“All this I steadfastly believe.” To add still further to the oddity of the circumstance, the father was a member of the Roman Catholic church, and the mother of the Established one.

Some account of **KALMUCK PRAYING MACHINES**: from Travels in the Caucasus and Georgia.—“Among the most remarkable of the sacred utensils of the temples, is the *Kürdä*, a cylindrical vessel of wood or metal, either very small, or of immense size. In its centre is fixed an iron axle; but the interior of the cylinder, which is quite hollow, is filled with sacred writings, the leaves of which are all stuck one to another at the edge, throughout the whole length. This paper is rolled tightly round the axis of the cylinder till the whole space is filled up. A close cover is fixed on at each end, and the whole *kürdä* is very neatly finished, painted on the outside with allegorical representations, or Indian prayers, and varnished. This cylinder is fastened upright in a frame by the axis; so that the latter, by means of a wheel attached to it below, may be set a-going with a string, and with a slight pull kept in a constant rotatory motion. When this cylinder is large, another, twice as small, and filled with writing, is fixed for ornament at the top of it. The inscription on such prayer-wheels commonly consists of masses for souls, psalms, and the six great general litanies, in which the most moving petitions are preferred for the welfare of all creatures. The text they sometimes repeat a hundred, or even a thousand times, attributing, from superstition, a proportionably augmented effect to this repetition, and believing that by these frequent copies, combined with their thousands of revolutions, they will prove so much the more efficacious. You frequently see, as well on the habitations of the priests, as on the whole roof

of the temple, small kûrdä placed close to each other, in rows, by way of ornament; and not only over the gates, but likewise in the fields, frames set up expressly for these praying-machines, which, instead of being moved by a string, are turned by the wind, by means of four sails, shaped and hollowed out like spoons.

“Other similar kûrdä are fastened to sticks of moderate thickness; a leaden weight is then fastened to the cylinder by a string, which, when it is once set a-going, keeps it, with the help of the stick, in constant motion. Such like prayer-wheels, neatly wrought, are fastened upon short sticks to a small wooden pedestal, and stand upon the altars, for the use of pious persons. While the prayer-wheel is thus turned round with one hand, the devotee takes the rosary in the other, and at the same time repeats penitential psalms.

“A fourth kind of these kûrdä is constructed on the same principle as those which are turned by wind, only it is somewhat smaller, and the frame is adapted to be hung up by a cord, in the chimneys of the habitations or huts of the Monguls. When there is a good fire, they are likewise set in motion by the smoke and the current of air, and continue to turn round as long as the fire is kept up.

“A fifth kind of kûrdä is erected on a small stream of water, upon a foundation like that of a mill, over which a small house is built to protect it from the weather. By means of the wheel attached to it, and the current, the cylinder is in like manner kept in a constant circular motion. These water kûrdä are commonly constructed on a large scale, and maintained at the joint expense of the inhabitants of a whole district. They have a reference to all aquatic animals, whether alive or dead, whose temporal and eternal happiness is the aim of the writings contained in them, in like manner as the object of the fire. Kûrdä is the salvation of the souls of all animals suffering by fire.”

CURIOUS ACCOUNT OF AN EXPIATORY PENANCE AT CALCUTTA.—About a mile from the town is a plain, where the natives annually undergo a very strange kind of penance on the 9th of April; some for the sins they have committed, others for those they may commit, and others in consequence of a vow made by their parents. This ceremony is performed in the following manner. Thirty bamboos, each about the height of twenty feet, are erected in the plain above-mentioned. On the top of these they contrive to fix a swivel, and another bamboo of thirty feet or more crosses it, at both ends of which hangs a rope. The people pull down one end of this rope, and the devotee, placing himself under it, the brahmin pinches up a large piece of skin under both the

shoulder blades, sometimes in the breasts, and thrusts a strong iron hook through each. These hooks have lines of Indian grass hanging to them, which the priest makes fast to the rope at the end of the cross bamboo, and at the same time puts a sash round the body of the devotee, laying it loosely in the hollow of the hooks, lest, by the skin giving way, he should fall to the ground. The people then haul down the other end of the bamboo: by which the devotee is immediately lifted up thirty feet or more from the ground, and they run round as fast as their legs can carry them. Thus the devotee is thrown out the whole length of the rope, where, as he swings, he plays a thousand antic tricks; being painted and dressed in a very particular manner, on purpose to make him look more ridiculous. Some of them continue swinging half an hour, others less. The devotees undergo a preparation of four days for this ceremony. On the first and third, they abstain from all kinds of food; but eat fruit on the other two. During this time of preparation they walk about the streets in their fantastical dresses, dancing to the sound of drums and horns; and some, to express the greater ardour of devotion, run a wire of iron quite through their tongues, and sometimes through their cheeks.

Happy are Christians in being delivered from the darkness, absurdities, and horrors of superstition, by the bright effulgence of the Sun of righteousness!

CHAP. LXV.

CURIOSITIES RESPECTING VARIOUS PHENOMENA OR APPEARANCES IN NATURE.

ON THE IGNIS FATUUS.

A wand'ring fire
 Compact of unctuous vapour, which the night
 Condenses, and the cold environs round,
 Kindled through agitation to a flame,
 (Which oft, they say, some evil spirit attends,)
 Hovering, and blazing with delusive light,
 Misleads th'amaz'd night-wanderer from his way
 Through bogs and mire. *Milton.*

THE *Ignis Fatuus* is a luminous appearance, which is most frequently observed in boggy districts and near rivers, though sometimes also in dry places. By its appearance, benighted travellers are said to have been sometimes led into imminent danger, taking it for a candle at a distance; from which

seemingly mischievous property it has been thought by the vulgar to be a spirit of a malignant nature, and been named accordingly, *Will-with-a-Wisp*, or *Jack-with-a-Lantern*; for the same reason that it had its Latin name *Ignis Fatuus*. This light is frequently seen about burying-places and dunghills. Some countries are also remarkable for it, as about Bologna in Italy, and some parts of Spain and Ethiopia. Its forms are so uncertain and variable, that they can scarcely be described, especially as philosophical observers seldom meet with it. Dr. Derham, however, one night perceived one of them, and got so near that he had a very advantageous view of it. This is very difficult to be obtained; for, among other singularities of the *ignis fatuus*, it avoids the approach of any person, and flies from place to place as if it were animated. That which Dr. Derham observed, was in some boggy ground betwixt two rocky hills; and the night was dark and calm, by which means he was enabled to advance within two or three yards of it. It appeared like a complete body of light without any division, so that he was sure it could not be occasioned by insects. It kept dancing about a dead thistle, till a very slight motion of the air, occasioned, as he supposed, by his near approach to it, made it jump to another place; after which it kept flying before him as he advanced.

Beccari obtained information, that two of these lights appeared in the plains about Bologna, the one north, the other south of that city, and were to be seen almost every dark night, especially that to the eastward, giving a light equal to an ordinary faggot. The latter appeared to a gentleman of his acquaintance, as he was travelling; moved constantly before him for about a mile, and gave a better light than a torch which was carried before him. Both these appearances gave a very strong light, and were constantly in motion. Sometimes they would rise, sometimes sink; but commonly they would hover about six feet from the ground; they would also frequently disappear on a sudden, and appear again in some other place. They differed also in size and figure, sometimes spreading pretty wide, and then contracting themselves; sometimes breaking into two, and then joining again. Sometimes they would appear like waves, at others they would seem to drop sparks of fire: they were but little affected by the wind; and in wet or rainy weather, were frequently observed to cast a stronger light than in dry weather: they were also observed more frequently when snow lay upon the ground, than in the hottest summer; but he was assured, that there was not a dark night throughout the whole year, in which they were not to be seen. The ground east of Bologna, where the largest of these was observed, is a hard chalky soil mixed with clay, which retains moisture long, but breaks

and cracks in hot weather. On the mountains, where the soil is looser, the *ignes fatui* were less. From the best information, M. Beccari found that these lights were very frequent about rivers and brooks. He concludes his narrative with the following singular account.—

“An intelligent gentleman travelling in the evening, between eight and nine o'clock, in a hilly road about ten miles south of Bologna, perceived a light which shone very strongly upon some stones which lay on the banks of the Rio Verde. It seemed to be about two feet above the stones, and near the water. In size and figure it had the appearance of a parallelo-piped, above a foot in length, and half a foot high, the largest side being parallel to the horizon. Its light was so strong, that he could plainly see by it part of a neighbouring hedge and the water of the river; only in the east corner of it the light was rather faint, and the square figure less perfect, as if it were cut off or darkened by the segment of a circle. On examining it a little nearer, he was surprised to find that it changed gradually from a bright red to a yellowish, and then to a pale colour, in proportion as he drew nearer; and when he came to the place itself it quite vanished. Upon this, he stepped back, and not only saw it again, but found that the farther he went from it, the stronger and brighter it grew. When he examined the place of this luminous appearance, he could perceive no smell, nor any other mark of fire.” Another gentleman informed M. Beccari, that he had seen the same light five or six different times in spring and autumn; and that it always appeared of the same shape, and in the very same spot. One night in particular, he observed it come out of a neighbouring field to settle in the usual place.

A very remarkable account of an *ignis fatuus* is given by Dr. Shaw, in his *Travels to the Holy Land*. It appeared in the valleys of mount Ephraim, and attended him and his company for above an hour. Sometimes it appeared globular, or like the flame of a candle, at others it spread to such a degree as to involve the whole country in a pale inoffensive light, then contracted itself, and suddenly disappeared, but in less than a minute it would appear again; sometimes, running swiftly along, it would expand itself at certain intervals over more than two or three acres of the adjacent mountains. The atmosphere from the beginning of the evening had been remarkably thick and hazy; and the dew, as they felt it on the bridles of their horses, was very clammy and unctuous. Lights resembling the *ignis fatuus* are sometimes observed at sea, skipping about the masts and rigging of ships; and Dr. Shaw informs us, that he has seen these in such weather as that just mentioned, when he saw the *ignis fatuus* in Palestine. Similar appearances have been observed in various

other situations; and we are told of one which appeared about the bed of a woman in Milan, surrounding it, as well as her body, entirely. This light fled from the hand which approached; but was at length entirely dispersed by the motion of the air.

Of the same kind also, most probably, are those small luminous appearances which sometimes appear in houses, or near them, called, in Scotland, *Elf-candles*, and which are supposed to portend the death of some person about the house. In general these lights are harmless, though not always; for some of them have encompassed stacks of hay and corn, and set them on fire; so that they became objects of great terror to the country people. Of these, it was observed, that they would avoid a drawn sword, or sharp-pointed iron instrument; and that they would be driven away by a great noise.

Several philosophers have endeavoured to account for these appearances, but hitherto with no great success; nor indeed does there seem to be sufficient data for solving all their phenomena. Sir Isaac Newton calls it a vapour shining without heat; and supposes that there is the same difference between a vapour of the ignis fatuus and flame, that there is between the shining of rotten wood and burning coals. But though this seems generally to be the case, there are exceptions, as has been instanced in the vapours which set fire to the stacks of corn. Dr. Priestley supposes that the light is of the same nature with that produced by putrescent substances; others, that the electrical fluid is principally concerned; but none have attempted to give any particular solution of the phenomena.

From the frequent appearance of the ignis fatuus in marshes, moist ground, burying-places, and dunghills, putrefaction seems to be concerned in the production of it. This process is attended with the emission of an aqueous steam, together with a quantity of fixed inflammable and alkaline air, blended together in one common vapour. It is likewise attended with some degree of heat, and there are some vapours, that of sulphur particularly, which becomes luminous with a degree of heat much less than that sufficient to set fire to combustibles. The putrid vapour, therefore, may be capable of shining with a still smaller degree of heat than that of sulphur, and consequently may become luminous by that which putrefaction alone affords. This would account for the ignis fatuus, were it only a steady luminous vapour arising from places where putrid matters are contained; but its extreme inobility, and flying from one place to another on the approach of any person, cannot be accounted for on this principle. If one quantity of the putrid vapour becomes luminous by means of heat, all the rest ought to do so likewise; so that though we may allow

heat and putrefaction to be concerned, yet of necessity we must have recourse to some other agent, which can be no other than electricity. Without this, it is impossible to conceive how any body of moveable vapour should not be carried away by the wind; but so far is this from being the case, that the *ignes fatui* described by M. Beccari, were but little affected by the wind. It is, besides, proved by undoubted experiment, that electricity is always attended with some degree of heat; and this, however small, may be sufficient to give a luminous property to any vapour on which it acts strongly: not to add, that the electric fluid itself is no other than light, and may therefore by its action easily produce a luminous appearance independent of any vapour. We have a strong proof that electricity is concerned, or indeed the principal agent, in producing the *ignis fatuus*, from an experiment related by Dr. Priestley, of a flame of this kind being artificially produced.

A gentleman, who had been making many electrical experiments for a whole afternoon in a small room, on going out of it, observed a flame following him at some little distance. This was doubtless a true *ignis fatuus*, and the circumstances necessary to produce it were then present, viz. an atmosphere impregnated with animal vapour, and likewise strongly electrified, for the quantity of perspiration emitted by a human body is by no means inconsiderable; and it, as well as the electricity, would be collected by reason of the smallness of the room. In this case, however, there seems to have been a considerable difference between the artificial *ignis fatuus*, and those commonly met with; for this flame followed the gentleman as he went out of the room, but the natural ones commonly fly from those who approach them. This may be accounted for, from a difference between the electricity of the atmosphere in the one room and the other; in which case the flame would naturally be attracted towards that place where the electricity was either different in quality or in quantity; but in the natural way, where all bodies may be supposed equally electrified for a great way round, a repulsion will as naturally take place. Still, however, this does not seem to be always the case. In those instances where travellers have been attended by an *ignis fatuus*, we cannot suppose it to have been influenced by any other power than what we call attraction, and which electricity is very capable of producing. Its keeping at some distance, is likewise easily accounted for; as we know that bodies possessed of different quantities of electricity may be made to attract one another for a certain space, and then repel without having ever come into contact. On this principle we may account for the light which surrounded the woman at Milan, but fled from the hand of any

other person. On the same principle may we account for those mischievous vapours which set fire to the hay and corn stacks, but were driven away by presenting to them a pointed iron instrument, or by making a noise. Both these are known to have a great effect upon the electric matter; and by means of either, lightning may occasionally be made to fall upon, or to avoid, particular places, according to the circumstances by which the general mass happens to be effected. On the whole, therefore, it seems most probable, that the ignis fatuus is a collection of vapours of the putrescent kind, very much affected by electricity; according to the degree of which, it will either give a weak or strong light, or even set fire to certain substances. This opinion seems to be confirmed from some luminous appearances observed in privies, where the putrid vapours have been collected into balls, and exploded violently on the approach of a candle. This last effect, however, we cannot so well ascribe to the electricity, as to the ascension of the inflammable air which abounds in such places.

In the Appendix to Dr. Priestley's third volume of Experiments and Observations on Air, Mr. Warltire gives an account of some very remarkable ignes fatui, which he observed on the road to Bromsgrove, about five miles from Birmingham. The time of observation was the 12th of December, 1776, before daylight. Many of these lights were playing in an adjacent field, in different directions; from some of which suddenly sprang up bright branches of light, somewhat resembling the explosion of a rocket that contained many brilliant stars, if the discharge was upwards, instead of the usual direction; and the hedge, and trees on each side of the hedge, were illuminated. This appearance continued but a few seconds, and then the jack-with-a-lantern played as before. Mr. Warltire was not near enough to observe if the apparent explosion was attended with any report.

Cronstedt gives it as his opinion, that ignes fatui, as well as falling stars, are owing to collections of inflammable air raised to a great height in the atmosphere. But, with regard to the latter, the vast height at which they move, evidently shews that they cannot be the effect of any gravitating vapour whatever; for the lightest inflammable air is one-twelfth of that of the common atmosphere: and we have no reason to believe, that at the distance of forty or fifty miles from the earth, the latter has near one-twelfth of its weight at the surface. From the account given by Mr. Warltire, we should be apt to conclude, that there is a strong affinity betwixt the ignes fatui and fireballs, insomuch that the one might be very easily converted into the other. Electricity can assume both these appearances, as is evident in the case of points

or even when the atmosphere is violently electrified, as around the string of an electrified kite, which always will appear to be surrounded with a blue flame in the night, if the electricity be very strong. On the whole, it appears that electricity, acting upon a small quantity of atmospherical air with a certain degree of vigour, will produce an appearance resembling an ignis fatuus; with a superior force it will produce a fire-ball; and a sudden increase of electrical power might produce those sparks and apparent explosions observed by Mr. Warltire. This appearance has produced many superstitious fears in the ignorant and uneducated.

To those who have, unfortunately, been badly educated in this respect, a friendly act would be, to endeavour with sound reasoning to convince them of their error, and dissuade them from giving heed, in future, to idle, superstitious, or inconsistent stories of any kind; advising them to furnish themselves with such knowledge, as may have a tendency to produce true pleasure and happiness through life, and which, when dying, they can reflect upon without uneasiness. "The natural offspring of prevailing superstition is infidelity. Of the truth of this, the present times afford us a lamentable example. Where ignorance and fear once ruled supreme, there has rash philosophy but too successfully planted presumption and atheism. 'Tis the diffusion of pure and solid knowledge, which alone can preserve us from the dominion of these opposite tyrants. How should this consideration increase our zeal and stimulate our endeavours! The immediate sphere of our action may be circumscribed, but our exertions will not on that account be entirely lost. In that circumscribed sphere let us labour to root out every superstitious lying vanity, and plant pure religion and unsophisticated truth in its stead.

"How charming, how enlivening to the soul, to gaze upon the dawning beams of opening light, to behold them irradiate that dismal gloom of intellectual darkness, which long overwhelmed the millions of mankind: how supremely pleasing, to view them wider and wider spreading their invigorating influence: how rapturously transporting, to contemplate the resplendent prospect of pure and perfect day!

"————— Power supreme!
O everlasting King! to thee we kneel,
To thee we lift our voice!"—

"O spread thy benign, thy vivifying light over the dwellings of the sons of men; dispel the yet impending mists of ignorance and superstition: and, O preserve us from the dismal gulf of infidelity and atheism; let thy truth run and prevail gloriously; let pure celestial wisdom overspread the earth as the waters cover the sea!—Then shall millions kneel

before thee with grateful and enraptured hearts; then shall they rejoice to sing the praises of thee, their Benefactor, their Father, and their God: then shall this vale of tears be filled with the mansions of joy and gladness, and become a blissful foretaste of those regions, where thy saints, crowned with unfading glory and felicity, surround thy throne with never-ceasing hallelujahs!"

See *Naylor on Vulgar Superstitions.*



CHAP. LXVI.

CURIOSITIES RESPECTING VARIOUS PHENOMENA OR APPEARANCES IN NATURE.—(*Continued.*)

Extraordinary Properties and Effects of Lighting—Thunder Rod—Fire Balls—Terrible Effects of Electrified Clouds—Surprising Effects of extreme Cold—Astonishing Expansive Force of Freezing.

— By conflicting winds together dashed,
The thunder holds his black tremendous throne;
From cloud to cloud the rending lightnings rage;
Till, in the furious elemental war
Dissolv'd, the whole precipitated mass
Unbroken floods and solid torrents pours.

Thomson.

EXTRAORDINARY PROPERTIES AND EFFECTS OF LIGHTNING.—A very surprising property of lightning of the zigzag kind, especially when near, is, its seeming omnipresence. If two persons are standing in a room looking different ways, and a loud clap of thunder, accompanied with zigzag lightning, happens, they will both distinctly see the flash, not only by that indistinct illumination of the atmosphere which is occasioned by fire of any kind, but the very form of the lightning itself, and every angle it makes in its course, will be as distinctly perceptible as if both had looked directly at the cloud from whence it proceeded. If a person happened at that time to be looking on a book, or other object which he held in his hand, he would distinctly see the form of the lightning between him and the object at which he looked. This property seems peculiar to lightning, and to belong to no other kind of fire whatever. In August 1763, a most violent storm of thunder, rain, and hail, happened at London, which did damage in the adjacent country to the amount of £50,000. Hailstones fell of an immense size, from two to ten inches in circumference, but the most surprising circumstance attending

the hurricane was, the sudden flux and reflux of the tide in Plymouth pool, exactly corresponding with the like agitation in the same place, at the time of the great earthquake at Lisbon. Instances have also occurred where lightning, by its own proper force, without any assistance from those less common agitations of the atmosphere or electric fluid, has thrown stones of immense weight to considerable distances; torn up trees by the roots, and broke them in pieces; shattered rocks; beat down houses, and set them on fire, &c. The following singular effect of lightning, upon a pied bullock, is recorded in the sixty-sixth volume of the Philosophical Transactions.—

“In the evening of Sunday the 28th of August, 1774, there was an appearance of a thunder storm, but we heard no report. A gentleman who was riding near the marshes not far from this town, (Lewes) saw two strong flashes of lightning running along the ground of the marsh, at about nine o'clock P. M. On Monday morning, when the servants of Mr. Roger, a farmer at Swanborough, went into the marsh to fetch the oxen to their work, they found one of them, a four-year-old steer, standing up, to appearance much burnt, and so weak as to be scarcely able to walk. The animal seemed to have been struck by lightning in a very extraordinary manner. He was of a white and red colour; the white in large marks, beginning at the rump bone, and running in various directions along both sides; the belly was all white, and the whole head and horns white likewise. The lightning, with which he must have been undoubtedly struck, fell upon the rump bone, which was white, and distributed itself along the sides in such a manner as to take off all the hair from the white marks as low as the bottom of the ribs, but so as to leave a list of white hair, about half an inch broad, all round where it joined to the red, and not a single hair of the red appears to have been touched. The whole belly was unhurt, but the end of the sheath of the penis had the hair taken off; it was also taken off from the dewlap: the horns and the curled hair on the forehead were uninjured; but the hair was taken off from the sides of the face, from the flat part of the jaw-bones, and from the front of the face, in stripes. There were a few white marks on the side and neck, which were surrounded with red; and the hair was taken off from them, leaving half an inch of white adjoining to the red. The farmer anointed the ox with oil for a fortnight; the animal purged very much at first, and was greatly reduced in flesh, but afterwards recovered.” In another account of this accident, the author supposes that the bullock had been lying down at the time he was struck; which shews the reason that the under parts were not touched. “The lightning, conducted by the white

hair, from the top of the back down the sides, came to the ground at the place where the white hair was left entire."

The author of this account says, that he inquired of Mr. Tooth, a farrier, whether he ever knew of a similar accident; and that he told him "the circumstance was not new to him; that he had seen many pied bullocks struck by lightning in the same manner; that the texture of the skin under the white hair was always destroyed, though looking fair at first; but after a while it became sore, throwing out a putrid matter in pustules, like the small-pox with us, which in time falls off, when the hair grows again, and the bullocks receive no farther injury;" which was the case with the bullock in question. In a subsequent letter, however, the very same author informs us, that he had inquired of Mr. Tooth, "whether he ever saw a stroke of lightning actually fall upon a pied bullock, so as to destroy the white hair, and shew evident marks of burning, leaving the red hair uninjured? He said he never did; nor did he recollect any one that had. He gave an account, however, of a pied horse, belonging to himself, which had been struck dead by lightning in the night time." The explosion was so violent, that Mr. Tooth imagined his house had been struck, and therefore immediately got up. On going into the stable, he found the horse almost dead, though it kept on its legs near half an hour before it expired. The horse was pied white on the shoulder, and greatest part of the head, viz. the forehead and nose, where the greatest force of the stroke came. "The hair was not burnt nor discoloured, only so loosened at the root, that it came off with the least touch. And this is the case, according to Mr. Tooth's observation, with all that he has seen or heard of, viz. the hair is never burnt, but the skin always affected. In the horse, all the blood in the veins under the white parts of the head was quite stagnated, though he could perceive it to flow in other parts as usual; and the skin, together with one side of the tongue, was parched and dried up to a greater degree than he had ever seen before." Another instance is mentioned of this extraordinary effect of lightning upon a bullock, in which even the small red spots on the sides were unaffected; and in this, as well as the former, the white hair on the under part of the belly, and on the legs, was left untouched.

One very singular effect of lightning is, that it has been observed to kill alternately, that is, supposing a number of people standing in a line; if the first person was killed, the second would be safe; the third would be killed, and the fourth safe; the fifth killed, &c. Effects of this kind are generally produced by the most violent kind of lightning; namely, that which appears in the form of balls, which

frequently divide themselves into several parts before they strike. If one of these parts of a fire-ball strike a man, another will not strike the person who stands immediately close to him; because there is always a repulsion between bodies electrified the same way. Now, as these parts into which the balls break have all the same kind of electricity, it is evident that they must for that reason repel one another, and this repulsion is so strong, that a man may be interposed within the stroke of two of them, without being hurt by either.

THUNDER ROD.—Dr. Franklin has demonstrated the identity of thunder with the electric explosion. He availed himself of many curious discoveries which he had made of electrical laws: in particular, having observed that electricity was drawn off at a great distance, and without the least violence of action, by a sharp metallic point, he proposed to philosophers to erect a tall mast or pole on the highest part of a building, and to furnish the top of it with a fine metallic point, properly insulated, with a wire leading to an insulated apparatus for exhibiting the common electrical appearances. To the whole of this contrivance he gave the name of *Thunder Rod*, which it still retains. He had not a proper opportunity of doing this himself, at the time of his writing his dissertation in a letter from Philadelphia to the Royal Society of London; but the contents were so scientific, and so interesting, that in a few weeks they were known over all Europe. His directions were followed in many places. In particular, the French academicians, encouraged by the presence of their monarch, and the great satisfaction which he expressed at the repetition of Dr. Franklin's most instructive experiments, which discovered and made known the theory of positive and negative electricity, as it is now received, were eager to execute his orders, and make his grand experiment, which promised so fairly to bring this tremendous operation of nature, not only within the pole of science, but in the management of human power. But in the mean time, Dr. Franklin, impatient of delay, and perhaps incited by the honourable desire of well-deserved fame, put his own scheme in practice. His inventive mind suggested to him a method of presenting a point to a thunder cloud at a considerable distance. This was, by fixing his point on the head of a paper kite, which the wind should raise to the clouds, while the wet string that held it should serve for a conductor of the electricity. With a palpitating heart, Dr. Franklin, unknown to his neighbours, and accompanied only by his son, went into the fields, and sent up his messenger that was to bring him news from the heavens. He obtained only a few sparks from his apparatus that day;

but returned to his house in a state of perfect satisfaction with his success. We may justly consider this as one of the greatest of philosophical discoveries, and as doing the highest honour to the inventor; for it was not a suggestion from an accidental observation, but arose from a scientific comparison of facts, and a sagacious application of the doctrine of positive and negative electricity; a doctrine wholly Dr. Franklin's, and the result of the most acute and discriminating observation. It was this alone, that suggested the whole; and, by explaining to his satisfaction the curious property of sharp points, gave him the courage to handle the thunderbolt of the heavens. It is now a point fully ascertained, that thunder and lightning are the electric snap and spark, as much superior to our puny imitations as we can conceive from the immense extent of the instruments in the hands of Nature.

If (says Dr. Franklin,) a conductor, one foot thick, and five feet long, will produce such snaps as agitate the whole human frame, what may we not expect from a surface of ten thousand acres of electrified clouds? How loud must be the explosion! how terrible the effects!

To this wonderful discovery, Dr. Darwin alludes in the following lines:—

Led by the phosphor light, with daring tread
Immortal Franklin sought the fiery bed;
Where, nurs'd in night, incumbent tempest shrouds
The seeds of thunder in circumfluent clouds,
Besieg'd with iron points his airy cell,
And pierc'd the monster slumb'ring in his shell.

FIRE BALLS,—are a kind of luminous bodies, commonly appearing at a great height above the earth, with a splendour surpassing that of the moon, and sometimes equalling her apparent size. They generally proceed in this hemisphere from north to south with vast velocity, frequently breaking into several smaller ones, sometimes vanishing with a report, and sometimes not. These luminous appearances, no doubt, constitute one branch of the ancient prodigies, or blazing stars. They sometimes resemble comets, in being attended with a train; but frequently they appear with a round well-defined disk. The first of these, of which we have any accurate account, was observed by Dr. Halley and others, at different places, in 1719. From the slight observations they could take of its course among the stars, its perpendicular height was computed at about seventy miles from the surface of the earth. The height of others has also been computed, and found to be various; though in general it is supposed to be beyond the limits assigned to our atmosphere, or where it loses its refractive power. The most remarkable of these on

record appeared on the 18th of August, 1783, about nine o'clock in the evening. It was seen to the northward of Shetland, and took a southerly direction for an immense space, being observed as far as the southern provinces of France and Rome. During its course, it appears frequently to have changed its shape; sometimes appearing in the form of one ball, sometimes two or more; sometimes with a train, sometimes without one. It passed over Edinburgh nearly in the zenith, and had then the appearance of a well-defined round body, extremely luminous, and of a greenish colour; the light which it diffused on the ground giving likewise a greenish cast to objects. After passing the zenith, it was attended by a train of considerable length, which, continually augmenting, at last obliterated the head entirely; so that it looked like a wedge, flying with the obtuse end foremost. The motion was not apparently swift, by reason of its great height; though in reality it must have moved with great rapidity, on account of the vast space it travelled over in a short time. In other places its appearance was very different. At Greenwich, we are told, that "two bright balls, parallel to each other, led the way, the diameter of which appeared to be about two feet; these were followed by an expulsion of eight others, not elliptical, seeming gradually to fall to pieces, for the last was small. Between each two balls a luminous serrated body extended, and at the last a blaze issued, which terminated in a point. Minute particles dilated from the whole. The balls were tinted first by a pure bright light, then followed a delicate yellow, mixed with azure, red, green, &c. which, with a coalition of bolder tints, and a reflection from the other balls, gave the most beautiful rotundity and variation of colours, that the human eye could be charmed with. The sudden illumination of the atmosphere, and the form and singular transition of this bright luminary, contributed much to render it awful: nevertheless, the amazingly vivid appearance of the different balls, and other rich connecting parts, not very easy to delineate, gave an effect equal to the rainbow in the zenith of its glory."

TERRIBLE EFFECTS OF ELECTRIFIED CLOUDS.—The most extraordinary instance of this kind perhaps on record, happened in the island of Java, in the East Indies, in August, 1772. On the 11th of that month, at midnight, a bright cloud was observed covering a mountain in the district called *Che-ribou*, and at the same time several reports were heard like those of a gun. The people who dwelt on the upper parts of the mountain, not being able to fly fast enough, a great part of the cloud, almost three leagues in circumference, detached itself under them, and was seen at a distance, rising and falling

like the waves of the sea, and emitting globes of fire so luminous, that the night became as clear as day. The effects of it were astonishing: every thing was destroyed for seven leagues round; the houses were demolished; plantations were buried in the earth; and two thousand one hundred and forty people lost their lives, besides fifteen hundred head of cattle, and a vast number of horses, goats, &c.

Another instance of a very destructive cloud, the electric qualities of which at present can scarcely be doubted, is related by Mr. Brydone, in his Tour through Malta. It appeared on the 29th of October, 1757. "About three-quarters of an hour after midnight, there was seen, to the south-west of the city of Valetta, a great black cloud, which, as it approached, changed its colour, till at last it became like a flame of fire mixed with black smoke. A dreadful noise was heard on its approach, which alarmed the whole city. It passed over the port, and came first on an English ship, which in an instant was torn in pieces, and nothing left but the hull; part of the masts, sails, and cordage, were carried to a considerable distance with the cloud. The small boats and selloques, that fell in its way, were all broken to pieces and sunk. The noise increased, and became more frightful. A sentinel, terrified at its approach, ran into his box; but both he and it were lifted up and carried into the sea, where he perished. It then traversed a considerable part of the city, and laid in ruins almost every thing that stood in its way. Several houses were laid level with the ground, and it did not leave one steeple in its passage. The bells of some of them, together with the spires, were carried to a considerable distance; the roofs of the churches demolished and beat down, &c. It went off at the north-east point of the city, and, demolishing the lighthouse, is said to have mounted up into the air with a frightful noise, and passed over the sea to Sicily, where it tore up some trees, and did other inconsiderable damage; but nothing material, as its fury had been spent at Malta. The number of killed and wounded amounted to near two hundred; and the loss of shipping, &c. was very considerable."—The effects of thunder storms, and the vast quantity of electric matter formed in the clouds which produce these storms, are so well known, that it is superfluous to mention them. It appears, however, that even these clouds are not so highly electrified as to produce their fatal effects on those who are immersed in them. It is only the discharge of part of their electricity upon such bodies as are either not electrified at all, or not so highly electrified as the cloud, that does all the mischief. We have, however, only the following instance on record, of any persons' being immersed in the body of a thunder cloud. Professor Saussure, and young Mr. Jalabert, when travelling over one of the high

Alps, were caught among clouds of this kind; and, to their astonishment, found their bodies so full of electrical fire, that spontaneous flashes darted from their fingers with a crackling noise, and the same kind of sensation as when strongly electrified by art.

Among the awful phenomena of nature, none have excited more terror than lightning and thunder. Some of the profligate Roman emperors, of whom history records that they procured themselves to be deified, confessed, by their trembling and hiding themselves, when they heard the thunder, that there was a divine power greater than their own—*Cæla tonantem Jovem*. The greatest security against the terrors of a thunder-storm, although no certain one against its effects, is that life of piety and virtue, which is the best guardian of every earthly blessing. The good man, who knows that every event is under the direction of an overruling Providence, and that this life is only a part of his existence, introductory to the blissful scenes of immortality, will behold the terrors of the storm with unshaken resolution: grateful to the Supreme Being, if permitted to escape from the danger; and acquiescing in the Divine Will, if thus to be conveyed, by an easy and instantaneous passage, to that heaven where his conversation had long been, and to that God with whom he delighted to walk.

These sentiments are beautifully expressed in the following lines, written in a midnight thunder-storm, by the celebrated Mrs. Carter, and addressed to a lady:—

Let coward guilt with pallid fear
To shelt'ring caverns fly,
And justly dread the vengeful fate
That thunders thro' the sky:

Protected by that hand, whose law
The threat'ning storms obey,
Intrepid virtue smiles secure.
As in the blaze of day.

In the thick cloud's tremendous gloom,
The lightning's lurid glare,
It views the same All-gracious Pow'r,
That breathes the vernal air.

Thro' nature's ever-varying scene,
By diff'rent ways pursu'd,
The one eternal end of Heav'n
Is universal good.

The same unchanging mercy rules
When flaming ether glows,
As when it tunes the linnet's voice
Or blushes in the rose.

By reason taught to scorn those fears
That vulgar minds molest,
Let no fantastic terrors break
My dear Narcissa's rest.

Thy life may all the tend'rest care
Of Providence defend,
And delegated angels round
Their guardian wings extend.

When thro' creation's vast expanse
The last dread thunders roll,
Untune the concord of the spheres,
And shake the rising soul;

Unmov'd may'st thou the final storm
Of jarring worlds survey,
That ushers in the glad serene
Of everlasting day.

The following lines on the same subject were written by
Mrs. Chapone :—

In gloomy pomp, whilst awful midnight reigns,
And wide o'er earth her mournful mantle spreads;
Whilst deep-voiced thunders threaten guilty heads,
And rushing torrents drown the frightened plains;
And quick-glanc'd lightnings, to my dazzled sight,
Betray the double horrors of the night:

A solemn stillness creeps upon my soul,
And all its powers in deep attention die;
My heart forgets to beat; my stedfast eye
Catches the flying gleam: the distant roll,
Advancing gradual, swells upon my ear
With louder peals, more dreadful as more near.

Awake, my soul, from thy forgetful trance!
The storm calls loud, and meditation wakes:
How at the sound pale superstition shakes,
Whilst all her train of frantic fears advance!
Children of darkness, hence! fly far from me!
And dwell with guilt and infidelity!

But come, with look compos'd and sober pace,
Calm Contemplation, come! and hither lead
Devotion, that on earth disdains to tread;
Her inward flame illumines her glowing face,
Her upcast eye, and spreading wings, prepare
Her flight for heaven, to find her treasure there.

She sees, enraptur'd through the thickest gloom,
Celestial beauty beam, and 'midst the howl
Of warring winds, sweet music charms her soul;
She sees, while rifted oaks in flames consume,
A FATHER God, that o'er the storm presides,
Threatens to save,—and loves when most he chides.

SURPRISING EFFECTS OF EXTREME COLD.—By extreme degrees of cold, trees are burst, rocks rent, and rivers and lakes frozen several feet deep: metallic substances blister the

skin like red-hot iron: the air, when drawn in by respiration, hurts the lungs, and excites a cough: even the effects of fire in a great measure seem to cease; and metals, though kept for a considerable time before a strong fire, will still freeze water when thrown upon them. When the French mathematicians wintered at Tornea, in Lapland, the external air, when suddenly admitted into their rooms, converted the moisture of the air into whirls of snow; their breasts seemed to be rent when they breathed it; the contact of it was intolerable to their bodies; and the spirit of wine, which had not been highly rectified, burst some of their thermometers by the congelation of the aqueous parts.

Extreme cold very often proves fatal to animals, in countries where the winters are very severe. Thus seven thousand Swedes perished at once, in attempting to pass the mountains which divide Norway from Sweden. It is not necessary, indeed, that the cold, in order to prove fatal to human life, should be so very intense as has been just mentioned. There is only requisite a degree somewhat below 32° of Fahrenheit, accompanied with snow or hail, from which shelter cannot be obtained. The snow which falls upon the clothes, or the uncovered parts of the body, then melts, and, by a continual evaporation, carries off the animal heat to such a degree, that a sufficient quantity is not left for the support of life. In such cases, the person first feels himself extremely chill and uneasy; he begins to grow listless, unwilling to walk or use exercise to keep himself warm; and at last turns drowsy, sits down to refresh himself with sleep, but wakes no more.

An instance of this was seen not many years ago at Terra del Fuego; where Dr. Solander, with some others, having taken an excursion up the country, the cold was so intense, that one of their number died. The Doctor himself, though he had warned his companions of the danger of sleeping in that situation, yet could not be prevented from making that dangerous experiment himself; and though he was awaked with all possible expedition, his body was so much shrunk in bulk, that his shoes fell off his feet, and it was with the utmost difficulty that he was recovered.

In those parts of the world where vast masses of ice are produced, the accumulation of it, by absorbing the heat of the atmosphere, occasions an absolute sterility in the adjacent countries, as is particularly the case with the island of Iceland; where the vast collections of ice floating out from the Northern Ocean, and stopped on that coast, are sometimes several years in thawing. Indeed, where great quantities of ice are collected, it would seem to have a power like fire, of both augmenting its own intenseness and that of the adjacent bodies.

ASTONISHINGLY EXPANSIVE FORCE OF FREEZING WATER.

—Although cold, in general, contracts most bodies, and heat expands them, yet there are some instances to the contrary, especially in the extreme cases or states of these qualities of bodies. Thus, though iron, in common with other bodies, expands with heat; yet, when melted, it is always found to expand in cooling again. Thus also, though water expands gradually as it is heated, and contracts as it cools, yet in the act of freezing it suddenly expands again, and that with an enormous force, capable of rending rocks, or bursting the very thick shells of metal, &c. A computation of the force of freezing water, has been made by the Florentine academicians, from the bursting of a very strong brass globe or shell by freezing water in it; when, from the known thickness and tenacity of the metal, it was found that the expansive power of a spherule of water only one inch in diameter, was sufficient to overcome a resistance of more than twenty-seven thousand pounds, or thirteen tons and a half.

Such a prodigious effect of expansion, almost double that of the most powerful steam-engines, and exerted in so small a mass, seemingly by the force of cold, was thought a very material argument in favour of those who supposed that cold, like heat, is a positive substance. Dr. Black's discovery of latent heat, however, has afforded a very easy and natural explication of this phenomenon. He has shewn, that, in the act of congelation, water is not cooled more than it was before, but rather grows warmer: that as much heat is discharged and passes from a latent and a sensible state, as, had it been applied to water in its fluid state, would have heated it to 135° . In this process, the expansion is occasioned by a great number of minute bubbles suddenly produced. Formerly these were supposed to be cold in the abstract, and to be so subtle, that, insinuating themselves into the substances of the fluid, they augmented its bulk, at the same time that, by impeding the motion of its particles upon each other, they changed it from a fluid to a solid. But Dr. Black shews, that these are only air extricated during the congelation; and to the extrication of this air he ascribes the prodigious expansive force exerted by freezing water. The only question, therefore, is, by what means this air comes to be extricated, and to take up more room than it naturally does in the fluid? To this it may be answered, that perhaps part of the heat, which is discharged from the freezing water, combines with air in its unelastic state, and, by restoring its elasticity, gives it that extraordinary force; as is seen in the case of air suddenly extricated in the explosion of gunpowder. The degree of expansion of water, in the state of ice, is by some authors computed at one tenth of its volume. Oil and quicksilver

shrink and contract after freezing. Mr. Boyle relates several experiments of vessels made of metals, very thick and strong; in which, when filled with water, closely stopped, and exposed to the cold, the water being expanded in freezing, and not finding either room or vent, burst the vessels. A strong barrel of a gun, with water in it, close stopped and frozen, was rent the whole length. Huygens, to try the force with which it expands, filled a cannon with it, whose sides were an inch thick, and then closed up the mouth and vent, so that none could escape; the whole being exposed to a strong freezing air, the water froze in about twelve hours, and burst the piece in two places. Hence mathematicians have computed the force of the ice upon this occasion; and they say, that such a force would equal twenty-seven thousand seven hundred and twenty pounds.

Major Edward Williams, of the Royal Artillery, made many experiments on the force of freezing water, at Quebec, in 1784-1785. He filled all sizes of bomb shells with water, then plugged the fuze-hole close up, and exposed them to the strong freezing air of the winter in that climate; sometimes driving in the iron plugs as hard as possible with a sledge hammer; and yet they were all thrown out by the sudden expansion of the water in the act of freezing, like a ball shot by gunpowder, sometimes to the distance of between four and five hundred feet, though they weighed near three pounds; and when the plugs were screwed in, or furnished with hooks or barbs to lay hold of the inside of the shell by, so that they could not possibly be forced out, in this case the shell was always split in two, though the thickness of the metal of the shell was about an inch and three-quarters. Through the circular crack, round about the shells, where they burst, there stood out a thin film or sheet of ice, like a fan; and in the cases where the plugs were projected by freezing water, there suddenly issued out from the fuze-hole a bolt of ice of the same diameter, and stood over it to the height sometimes of eight inches and a half.

CHAP. LXVII.

CURIOSITIES RESPECTING VARIOUS PHENOMENA, OR
APPEARANCES IN NATURE.—(*Continued.*)

Water Spout—Fata Morgana—Fairy Rings—Sheet of Phosphoric Fire—Phosphorus

—————Every object of creation
Can furnish hints to contemplation.

Gay.

WATER SPOUT.—This extraordinary meteor is most frequently observed at sea. It generally begins by a cloud, which appears very small, and which is called, by sailors, the Squall. This augments in a little time into an enormous cloud of a cylindrical form, or that of a cone on its apex, and produces a noise like the roaring of an agitated sea, sometimes accompanied with thunder and lightning, and also large quantities of rain or hail, sufficient to inundate large vessels; and to carry away in their course, (when they occur by land,) trees, houses, and every thing that opposes their impetuosity. Sailors, dreading the fatal consequences of water-spouts, endeavour to dissipate them by firing a cannon into them just before they approach the ship. We shall give an account of one, as described by M. Tournefort, in his *Voyage to the Levant*.

“The first of these (says this traveller) that we saw, was about a musket-shot from our ship. There we perceived the water begin to boil, and to rise about a foot above its level. The water was agitated, and whitish; and above its surface there seemed to stand a smoke, such as might be imagined to come from wet straw before it begins to blaze. It made a sort of a murmuring sound, like that of a torrent heard at a distance, mixed, at the same time, with a hissing noise, like that of a serpent: shortly after we perceived a column of this smoke rise up to the clouds, at the same time whirling about with great rapidity. It appeared to be as thick as one’s finger; and the former sound still continued. When this disappeared, after lasting for about eight minutes, upon turning to the opposite quarter of the sky, we perceived another, which began in the manner of the former; presently after, a third appeared in the west; and instantly beside it, still another arose. The most distant of these three could not be above a musket-shot from the ship. They all appeared like so many heaps of wet straw set on fire, and continued to smoke, and to make the same noise as before. We soon

after perceived each, with its respective canal, mounting up in the clouds; and spreading, where it touched the cloud, like the mouth of a trumpet; making a figure (to express it intelligibly) as if the tail of an animal was pulled at one end by a weight. These canals were of a whitish colour, and so tinged, as I suppose, by the water which was contained in them; for, previous to this, they were apparently empty, and of the colour of transparent glass. These canals were not straight, but bent in some parts, and far from being perpendicular, by rising in their clouds with a very inclined ascent.

“But what is very remarkable, the spouts crossed each other, in the form of a St. Andrew’s cross. In the beginning they were all about as thick as one’s finger, except at the top, where they were broader, and two of them disappeared; but shortly after, the last of the three increased considerably, and its canal, which was at first so small, soon became as thick as a man’s arm, then as his leg, and at last thicker than his whole body. We saw distinctly, through this transparent body, the water, which rose up with a kind of spiral motion; and it sometimes diminished a little of its thickness, and again resumed the same, sometimes widening at top, and sometimes at the bottom, exactly resembling a gut filled with water, pressed with the fingers to make the fluid rise or fall; and I am well convinced that this alteration in the spout was caused by the wind, which pressed the cloud, and compelled it to give up its contents. After some time its bulk was so diminished as to be no thicker than a man’s arm again, and thus swelling and diminishing, it at last became very small. In the end, I observed the sea which was raised about it to resume its level by degrees, and the end of the canal that touched it to become as small as if it had been tied round with a cord; and this continued till the light, striking through the cloud, took away the view. I still, however, continued to look, expecting that its parts would join again, as I had before seen in one of the others, in which the spout was more than once broken, and yet the parts again came together; but I was disappointed, for the spout appeared no more.”

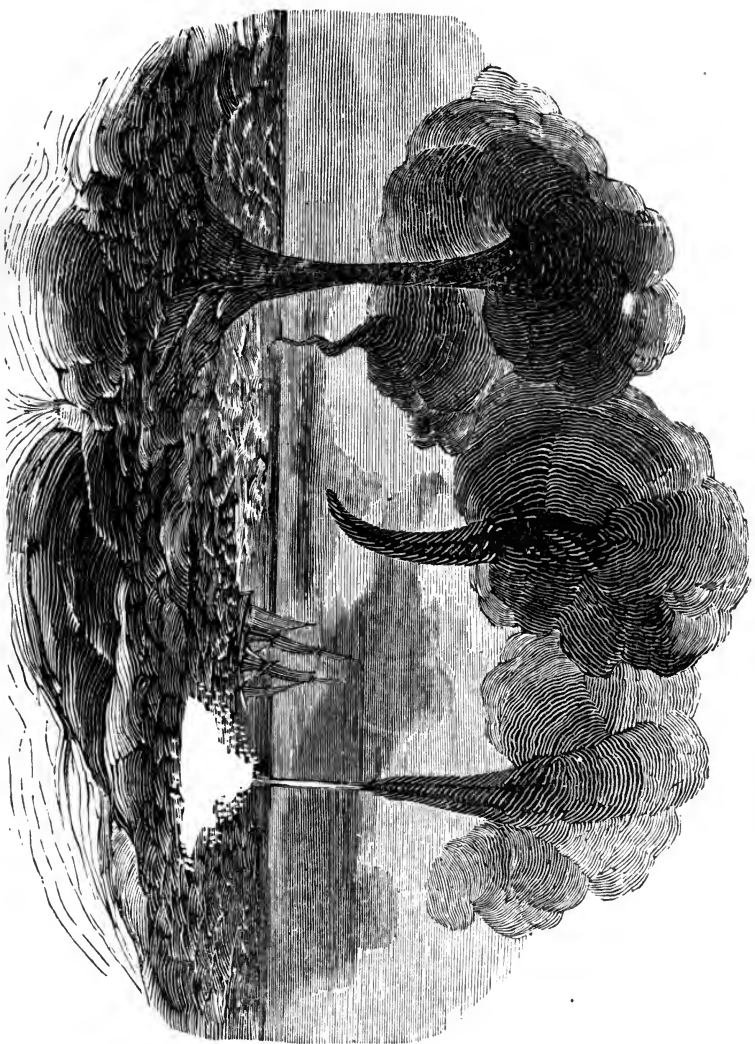
In the Philosophical Transactions, (volume xxii. and xxiii.) we have descriptions of several of these phenomena: their effects, in some instances, are probably much exaggerated. One at Topsham is said to have cut down an apple-tree, several inches in diameter: another, we are told, seemed to be produced by a concourse of winds, turning like a screw, the clouds dropping into it: it threw trees and branches about with a gyratory motion.—One in Deeping Fen, Lincolnshire, was first seen moving across the land and water of the fen: it raised the dust, broke some gates, and destroyed a field of turnips: it vanished with an appearance of fire.—

Dr. Franklin supposes that a vacuum is made by the rotatory motion of the ascending air, as when water is running through a funnel, and that the water of the sea is thus raised. But Dr. Young says, no such cause could do more than produce a slight rarefaction of the air, much less raise the water to the height of thirty or forty feet, or more.

Professor Wolke describes a water-spout, which passed immediately over the ship in which he was sailing, in the gulf of Finland: it appeared to be twenty-five feet in diameter, consisting of drops about the size of cherries. The sea was agitated round its base, through a space of about one hundred and thirty feet in diameter. One of the latest accounts of the phenomenon of a water-spout, is that read to the Royal Society in the year 1803, from a letter written to Sir Joseph Banks, by Captain Ricketts, of the royal navy. In the month of July, 1800, Captain Ricketts was called on deck, on account of the rapid approach of a water-spout, among the Lipari islands. It had the appearance of a viscid fluid, tapering in its descent, proceeding from the cloud to join the sea. It moved at the rate of about two miles an hour, with a loud sound of rain. It passed the stern of the ship, and wetted the afterpart of the main-sail: hence it was inferred, that water-spouts are not continuous columns of water; and subsequent observations confirmed the opinion. In November, 1801, about twenty miles from Trieste, a water-spout was seen eight miles to the south; round its lower extremity was a mist, about twelve feet high, somewhat in the form of an Ionian capital, with very large volutes, the spout resting obliquely on its crown. At some distance from this spout the sea began to be agitated, and a mist rose to the height of about four feet; then a projection descended from the black cloud that was impending, and met the ascending mist about twenty feet above the sea; the last ten yards of the distance were described with very great rapidity. A cloud of a light colour appeared to ascend in this spout, something like quicksilver in a tube. The first spout then snapped at about one-third of its height, the inferior part subsiding gradually, and the superior curling upwards. Several other projections from the cloud appeared, with corresponding agitations of the water below, but not always in spots vertically under them: seven spouts in all were formed; two other projections being re-absorbed. Some of the spouts were not only oblique, but curved: the ascending cloud moved most rapidly in those which were vertical: they lasted from three to five minutes, and their dissipation was attended by no fall of rain.

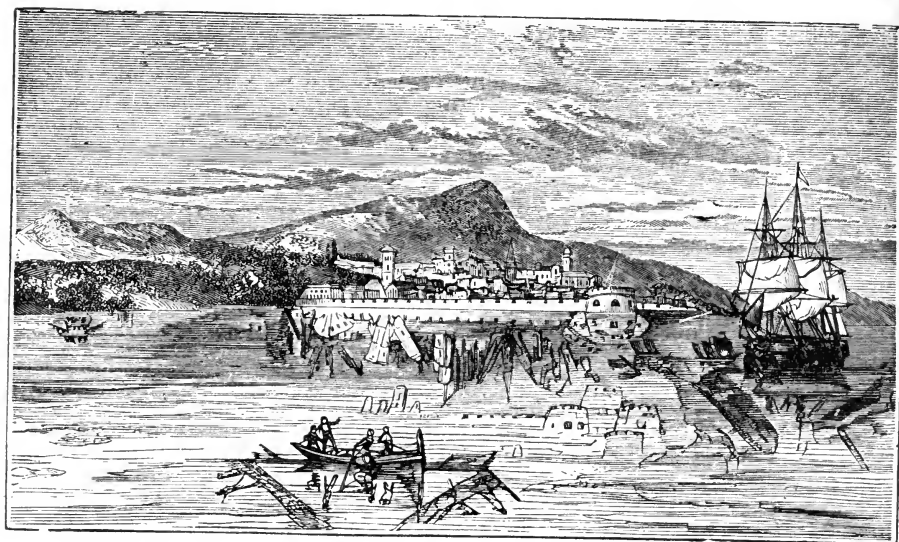
FATA MORGANA.—This is a very remarkable ærial phenomenon, which is sometimes observed from the harbour of

Messina, and adjacent places, at a certain height in the atmosphere. The name, which signifies the *Fairy Morgana* is derived from an opinion of the superstitious Sicilians, that the whole spectacle is produced by fairies, or such like visionary invisible beings. The populace are delighted whenever it appears; and run about the streets shouting for joy, calling every body out to partake of the glorious sight. This singular meteor has been described by various authors; but the first who mentioned it with any degree of precision was Father Angelucci, whose account is thus quoted by Mr. Swinburne in his Tour through Sicily: "On the 15th of August, 1643, as I stood at my window, I was surprised with a most wonderful delectable vision. The sea that washes the Sicilian shore swelled up, and became, for ten miles in length, like a chain of dark mountains; while the waters near our Calabrian coast grew quite smooth, and in an instant appeared as one clear polished mirror, reclining against the aforesaid ridge. On this glass was depicted, in *chairo scuro*, a string of several thousands of pilasters, all equal in altitude, distance, and degree of light and shade. In a moment they lost half their height, and bent into arcades, like Roman aqueducts. A long cornice was next formed on the top, and above it arose castles innumerable, all perfectly alike. These soon split into towers, which were shortly after lost in colonnades, then windows, and at last ended in pines, cypresses, and other trees, even and similar. This is the *Fata Morgana*, which for twenty-six years I had thought a mere fable." To produce this pleasing deception, many circumstances must concur, which are not known to exist in any other situation. The spectator must stand with his back to the east, in some elevated place behind the city, that he may command a view of the whole bay; beyond which the mountains of Messina rise like a wall, and darken the back ground of the picture. The winds must be hushed, the surface quite smoothed, the tide at its height, and the waters pressed up by currents to a great elevation in the middle of the channel. All these events coinciding, as soon as the sun surmounts the eastern hills behind Reggio, and rises high enough to form an angle of forty-five degrees on the water before the city, every object existing or moving at Reggio, will be repeated one thousand-fold upon this marine looking-glass, which, by its tremulous motion, is as it were cut into facets. Each image will pass rapidly off in succession, as the day advances, and the stream carries down the wave on which it appeared. Thus the parts of this moving picture will vanish in the twinkling of an eye. Sometimes the air is at that moment so impregnated with vapours, and undisturbed by winds, as to reflect objects in a kind of aerial screen, rising about thirty feet above the level of the sea. In

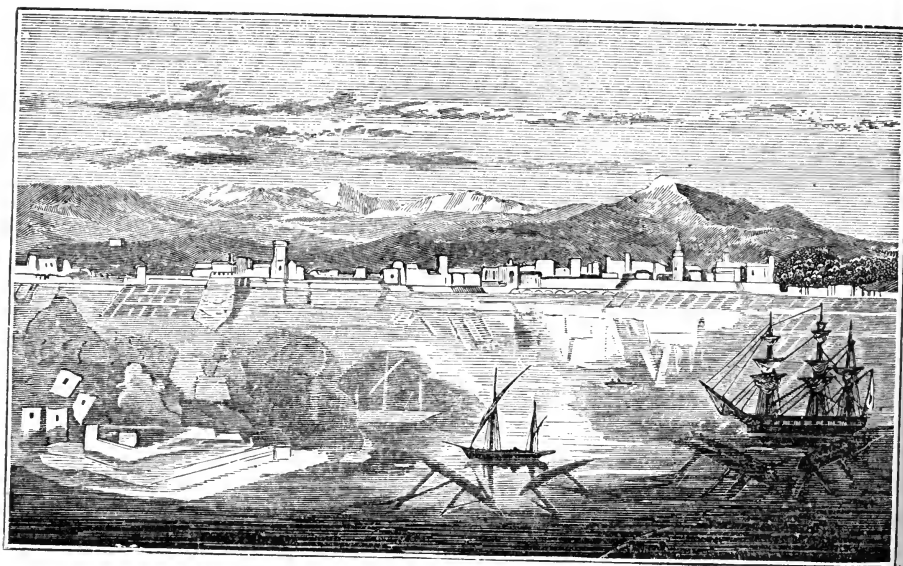


WATER SPOTS.

These phenomena are the great terror of sailors, who endeavour to dissipate them by firing cannon into them.



THE FATA MORGANA,
As observed in the harbour of Messina.



THE FATA MORGANA,
As observed at Reggio

cloudy heavy weather, they are drawn on the surface of the water, bordered with fine prismatical colours.

To the above account we shall add the following, given by M. Houel, whose judgment and veracity render his authority highly respectable.

"In fine summer days, when the weather is calm, there rises above the great current a vapour, which acquires a certain density, so as to form in the atmosphere horizontal prisms, whose sides are disposed in such a manner, that when they come to their proper degree of perfection, they reflect and represent successively, for some time, (like a moveable mirror,) the objects on the coast, or in the adjacent country. They exhibit by turns, the city and suburbs of Messina, trees, animals, men, and mountains. They are certainly beautiful aërial moving pictures. There are sometimes two or three prisms, equally perfect; and they continue in this state eight or ten minutes. After this, some shining inequalities are observed upon the surface of the prism, which render confused to the eye, the objects which had been before so accurately delineated, and the picture vanishes. The vapour forms other combinations, and is dispersed in the air. Different accounts have been given of this singular appearance; which for my part I attribute to a bitumen that issues from certain rocks at the bottom of the sea, and which is often seen to cover a part of its surface in the canal of Messina. The subtle parts of this bitumen being attenuated, combined, and exhaled with the aqueous globules that are raised by the air, and formed into bodies of vapour, give to this condensed vapour more consistence; and contribute, by their smooth and polished particles, to the formation of a kind of aërial crystal, which receives the light, reflects it to the eye, and transmits to it all the luminous points which colour the objects exhibited in this phenomenon, and render them visible."

FAIRY RINGS,—are circles of dark green grass frequently observed in old pastures; they have long been known under the name of fairy rings, and have generally been supposed to be occasioned, in some way or other, by electricity. Dr. Wollaston has, in a late volume of the Transactions of the Royal Society, given a new and very ingenious theory, of which we shall present our readers with a brief account, premising, that Mr. Davy, in the course of his lectures at the Royal Institution, had occasion to refer to the subject, and seemed to coincide in opinion with Dr. Wollaston. That which first attracted his notice was the position of certain fungi, which are always found growing upon these circles, if examined in a proper season. The position of these fungi led him to imagine that the progressive increase from a central point was

the probable mode of formation of the ring: hence he conjectured that the soil, which had once contributed to the support of the fungi, might be so exhausted of some peculiar pabulum necessary for their production, as to be rendered incapable of producing a second crop. The second year's crop would, if this theory be just, appear in a small ring surrounding the original centre of vegetation; and at every succeeding year the defect of nutriment on one side, would necessarily cause the new roots to extend themselves solely in the opposite direction, and would occasion the circle of fungi continually to proceed, by an annual enlargement, from the centre outwards. An appearance of luxuriance of the grass would follow as a natural consequence, as the soil of an interior circle would always be enriched, by the decayed roots of fungi of the year's growth. This theory is supported by some observations of Dr. Withering; and Dr. Wollaston says, by way of confirmation, that whenever two adjacent circles are found to interfere, they not only do not cross each other, but both circles are invariably obliterated between the points of contact: the exhaustion occasioned by each obstructs the progress of the other, and both are starved.—Philosophical Transactions, 1807, Part II.

Though it cannot be doubted that most fairy rings, if not all of them, have considerable relation to the running of a fungus; there, nevertheless, seems reason to conclude that electricity may likewise be concerned in their production. The electrical effect may relate to fairy rings of a different kind from those occasioned by the fungus, or it may have been antecedent to the production of the vegetable. It is a familiar effect in our experiments, that the spark proceeding from a positive conductor, breaks or radiates at about one-third of its course, and strikes the receiving conductor by a central spark surrounded by other smaller ones. The concentric rings produced upon polished metallic surfaces by the strong explosion of a battery, as first observed by Dr. Priestley, appears to be a fact of the same kind; and the forked radiations of lightning are well known. There is related, in the Philosophical Journal, volume I. 4to, some events which happened in Kensington Gardens in June, 1781, when a powerful thunder-storm passed over the western extremity of London. The explosions were very marked and distinct, and in many instances forked at the lower end, but never at the top; from which it seems proper to conclude, that the general mass of clouds, or, at least, that extremity which passed over London, was in the state called positive.

Five days afterwards, upon visiting Kensington Gardens, it was observed, that every part of that extensive piece of ground shewed marks of the agency of the lightning, chiefly by dis

coloration of the grass in zigzag streaks, some of which were fifty or sixty yards in length. Instances of this superficial course of the lightning along the ground, before it enters the earth, are sufficiently frequent. But the circumstance applicable to our present subject is, that several trees had been struck by the lightning. Two of them, which stood on the outside to the westward, had holes torn in the ground, close to the trunk; and round one of these trees was a space of six feet in diameter, in which the grass was very much scorched. Another tree on the west was surrounded by a faint ring of burnt or faded grass, which seemed to be occasioned by some earlier stroke, as the vegetation had begun to shoot up again. Another tree, standing on the out side to the south, was surrounded by a ring of twelve feet diameter, and eighteen inches broad. Within the ring the grass was fresh; but on the surface of the ring, the grass and the ground were much burned. To the eastward of the tree, upon the ring itself, were two holes, in which the ground had the appearance of ashes. Another tree, on the east side of the grove, had the half of a faint ring to the westward. And, lastly, a tree which stood in the middle was surrounded by a faint ring of twelve feet diameter, within which the grass was unhurt; and to the westward, at the distance of about three feet from the inner ring, was part of another similar ring, of nearly the same appearance; the verdure being unhurt in the interval between the rings.

A SHEET OF PHOSPHORIC FIRE.—A curious instance of this occurred to Monsieur Peron, in his voyage from Europe to the Isle of France. Between three and four degrees north latitude, during the obscurity of a night intensely dark, the wind blowing a hurricane, and the vessel making a rapid progress, he was struck by the sudden appearance of a vast sheet of phosphoric fire, floating before the ship, and covering a considerable space. The vessel presently made its way through this inflamed part of the sea, which enabled the observant navigator to discover that this prodigious light was occasioned entirely by an immense number of small animalcules, which swam at different depths, and appeared to assume various forms. Those which were most immersed in the water, looked like great red-hot cannon balls: whilst those on the surface resembled cylinders of red-hot iron. Some of them were soon caught, and found to vary in size, from three to seven inches. All the outside surface of the animal was bristled with thick oblong tubercles, shining like so many diamonds; and these seemed to be the principal seat of its wonderful phosphorescence. The inside, also, appeared furnished with a multitude of little, narrow, oblong

glands, which possessed the phosphoric virtue in a high degree.

When in a tranquil state, the colour of these brilliant inhabitants of the ocean is an opal yellow, mixed with green; but, on the slightest movement of those voluntary contractions exercised by the creature, or those which the observer can at pleasure excite by the least irritation, the animal seems to inflame, and it becomes instantly like a piece of red-hot iron of the most vivid brilliancy. When its phosphorescency declines, it assumes a succession of light elegant tints, that are very pleasing to the eye, such as red, aurora, orange, green, and azure blue; the last is particularly lively and pure. The organization of this animal, which is called the *Pyrosoma Atlanticum*, ranks it amongst the most singular of the zoophite tribe; whilst its extraordinary phosphoric powers render it the most beautiful that has yet been seen.

It may be not amiss to conclude this chapter with an account of that very curious substance, PHOSPHORUS.—This singular production was accidentally discovered, in 1677, by an alchymist of Hamburgh, named Brandt, when he was engaged in searching for the philosopher's stone. Kunkel, another chemist, who had seen the new product, associated himself with one of his friends, named Krafft, to purchase the secret of its preparation; but the latter deceiving his friend, made the purchase for himself, and refused to communicate it. Kunkel, who at this time knew nothing further of its preparation, than that it was obtained by certain processes from urine, undertook the task, and succeeded. It is on this account that the substance long went under the name of Kunkel's phosphorus. Mr. Boyle is also considered as one of the discoverers of phosphorus. He communicated the secret of the process for preparing it, to the Royal Society of London, in 1680. It is asserted, indeed, by Krafft, that he discovered the secret to Mr. Boyle, having, in the year 1678, carried a small piece of it to London, to shew it to the royal family; but there is little probability that a man of such integrity as Mr. Boyle would claim the discovery of the process as his own, and communicate it to the Royal Society, if this had not been the case. Mr. Boyle communicated the process to Godfrey Hankwitz, an apothecary of London, who for many years supplied Europe with phosphorus, and hence it went under the name of English Phosphorus. In the year 1774, the Swedish chemists, Gahn and Scheele, made the important discovery, that phosphorus is contained in the bones of animals; and they improved the processes for procuring it.

When phosphorus is heated to the temperature of 148° , it takes fire, burns with a bright flame, and gives out a great quantity of white smoke. Phosphorus enters into combination with oxygen, azote, hydrogen, and carbon. Phosphorus is soluble in oils, and, when thus dissolved, forms what has been called liquid phosphorus, which may be rubbed on the face and hands without injury. It dissolves too in ether; and a very beautiful experiment consists in pouring this phosphoric ether in small portions, and in a dark place, on the surface of hot water. The phosphoric matches consist of phosphorus extremely dry, minutely divided, and perhaps a little oxygenized. The simplest mode of making them, is to put a little phosphorus, dried by blotting paper, into a small phial; heat the phial, and when the phosphorus is melted, turn it round, so that the phosphorus may adhere to the sides. Cork the phial closely, and it is prepared. On putting a common sulphur match into the bottle, and stirring it about, the phosphorus will adhere to the match, and will take fire when brought out into the air.



CHAP. LXVIII.

CURIOSITIES RESPECTING VARIOUS PHENOMENA, OR
APPEARANCES IN NATURE—(Continued.)

*Spots in the Sun—Diminution of the Sun—Parhelia, or Mock
Suns—Eclipses—Halo, or Corona; and similar Appearances—
Falling or Shooting Star—Volcanoes in the Moon.*

Hail, sacred source of inexhausted light!
Prodigious instance of creating might!
His distance man's imagination foils;
Numbers will scarce avail to count the miles.
His globose body how immensely great!
How fierce his burnings! how intense his heat!
As swift as thought, he darts his radiance round
To distant worlds, his system's utmost bound;
Of all the planets the directing soul,
That heightens and invigorates the whole. *Brown.*

SPOTS IN THE SUN.—THE following account of the spots in the sun is taken from a French paper.

“The spots were seen for the first time in 1611; and nearly about the same time by J. Fabricius, at Wittenberg, by the Jesuit Scheiner, and by Galileo. This great man watched their course with so much attention, and so well developed their phenomena, that very little has been since added to the

descriptions which he gave, except more precise measures. The spots of the sun are at present viewed with astronomical telescopes, in which the great brilliancy of that luminary is mitigated, and not effaced, by the coloured glass placed between the telescope and the eye. There are in the interior of the telescope, at the focus of the object, some very fine threads stretched crosswise, and moveable parallel to each other, by means of which the distance of the spot from the nearest border of the sun's disk may be ascertained, which determines its position on the disk at the moment of observation. By following in this manner the same spot for several days, it is perceived to change its place. Its size also varies much. The spots sometimes grow thinner, and disperse from one day to another: and hence it is, that, though in one month rather a large number was visible, in the following only two are to be seen. But during the whole time of their presence they pursue a regular course, of which the aspects are common to all.

“When they first come in sight, they appear on the sun's border, like a slender thread. In proportion as they advance towards the middle of the disk, they appear, from day to day, to enlarge in the direction of their movement. They then decrease periodically; and if they last long enough to traverse the whole disk, they go off by the opposite side, narrowing to a single thread. These appearances are evidently such as a small body, adhering to a spherical surface, and revolving with or upon that surface, must present. The diminution of the spots, in proportion as they approximate the borders of the disk, results from this—that they then project more obliquely, and are only seen sidewise; but when in the middle of the disk, they are seen in their full extent. In fine, upon comparing the direction and rapidity of their course, it soon becomes evident, that the supposition of their adhering to the body of the sun is the only admissible one. On thus tracing the route of all those which appear, it is ascertained that they move in courses exactly parallel, describing circles which all have their centre on a common axis, passing through the centre of the sun. The size of these circles varies on different points of the disk, according to the same laws as on a sphere; and the rate of movement is modified in such a way, that all the circles are run through in equal times. This perfect concordance of revolution in spots so changeable in other respects, evidently shews that they must be attached to one and the same round body, which makes them revolve altogether with a common motion. Hence it has been concluded, that the sun revolves upon itself with the general motion of these spots, that is, in twenty-five days and a half, in like manner as our earth revolves in twenty-four hours. The same calcu-

lation, applied to the spots which have been discovered on the other planets, has in like manner made us acquainted with their rotation.

“As to the nature of these solar spots, it is absolutely unknown. Herschel is of opinion, that luminous clouds float in the inflamed atmosphere of this luminary, as clouds of vapour float in ours. He supposes that the body of the sun is opaque and dark; and that the black spots observed there at intervals, are merely the summits of very elevated mountains, which the solar clouds permit us to see between their openings. Other astronomers think that the globe of the sun is on fire, and that the spots are merely immense scoria, launched on the surface of that mass by some terrible explosions, of which our terrestrial volcanoes afford but a feeble picture. But whatever may be thought of these conjectures, it seems sufficient for us to know, that the solar spots are trifling compared with the immense mass of that body; and that the eruptions, of which they are perhaps the effect, take place at too great a distance from our earth to produce the least effect upon it. Generally speaking, the physical state of our little world is incomparably more stable and steady than its moral state.”

DIMINUTION OF THE SUN.—Baron Lindeneau, who recently published a work on the diminution of the solar mass says, that the sun may have been imperceptibly subject to successive diminution since the science of astronomy has been cultivated. Baron Lindeneau supposes the sun's diameter to be 800,000 miles, 4,204,000,000 feet, or nearly 2000 seconds. We have not, he observes, hitherto possessed any instrument for measuring the diameter of the heavenly bodies to a second. The sun may therefore diminish 12,000 of its diameter, or 2,102,000 feet, without the possibility of being perceived. Supposing the sun to diminish daily two feet, it would require *three thousand* years to render the diminution of a second of its diameter visible.

Account of those singular Appearances, called, PARHELIA OR MOCK SUNS.—

As when two suns appear in th' azure sky,
Mounted in Phoebus' chariot fierce and bright;
Both darting forth fair beams to each man's eye;
And both adorn'd with lamps of flaming light,
All that behold such strange prodigious sight,
Not knowing nature's work, nor what to weene,
Are wrapt with wonder, and with rare affrighte. *Spenser.*

A Parhelion is a meteor in form of a bright light, appearing on one side of the sun. Phenomena of this kind have been mentioned both by the ancients and moderns *Aristotle*

observes, that in general they are seen only when the sun is near the horizon, though he takes notice of two that were seen in Bosphorus from morning till evening; and Pliny has related the times when such phenomena were observed at Rome. Gassendi says, that in 1635-1636 he often saw one mock sun. Two were observed by M. de la Hire in 1689; and the same number by Cassini in 1693; by Mr. Grey in 1700, and by Dr. Halley in 1702; but the most celebrated phenomena of this kind were seen at Rome by Scheiner; by Muschenbroek at Utrecht; and by Hevelius at Ledan. By the two former, four mock suns were observed; and by the latter, seven. Parhelia are apparently of the same size with the sun, though not always of the same brightness, nor even of the same shape; and when a number appear at once, there is some difference in both respects among them. Externally they are tinged with colours like the rainbow; and many have a long fiery tail opposite the sun, but paler towards the extremity. Parhelia are generally accompanied with coronas, some of which are tinged with rainbow colours, but others are white. (See *Halo*) They differ in number and size; but all agree in breadth, which is that of the apparent diameter of the sun. A very large white circle, parallel to the horizon, generally passes through all the parhelia; and, if it were entire, it would go through the centre of the sun. Sometimes there are arcs of lesser circles concentric to this, touching those coloured circles which surround the sun. They are also tinged with colours, and contain other parhelia. Other circles are said to have been obliquely situated with respect to all these. The order of the colours in these circles is the same as in the rainbow; but on the inside, with respect to the sun, they are red, as is also observed in many haloes. Parhelia have been visible for one, two, three, and four hours together; and in North America, they are said to continue some days, and to be visible from sunrise to sunset. When the parhelia disappear, it sometimes rains, or snow falls in the form of oblong spiculæ, as Maraldi, Weidler, Krafft, and others, have observed; and because the air in North America abounds with such frozen spiculæ, which are even visible to the eye, according to Ellis and Middleton, such particles have been thought to be the cause of all coronas and parhelia.

Mr. Wales says, that at Churchill, in Hudson's Bay, the rising of the sun is always preceded by two long streams of red light, one on each side, and about twenty degrees distant from him. These rise as the sun rises; and as they grow longer, they begin to bend towards each other, till they meet directly over the sun, just as he rises, forming there a parhelion, or mock sun. These two streams of light, he says,

seem to have their source in two other parhelia, which rise with the true sun; and in winter, when the sun never rises above the haze or fog, which he says is constantly seen near the horizon, all these accompany him the whole day, and set with him. Once or twice he saw a fourth parhelion, directly under the sun; but this is not common. These facts being constant, are very valuable, and may throw great light on the theory of these remarkable phenomena. Sometimes parhelia appear in a different manner; as when three suns have been seen in the same vertical circle, well defined, and touching one another. The true sun was in the middle, and the lowest touched the horizon, and they set one after the other. This appearance was seen by Malezew, in 1722. Other appearances similar to this are recited by Mr. Muschenbroek. Sometimes the sun has risen or set with a luminous tail projecting from him, of the same breadth with his diameter, and perpendicular to the horizon. Such an appearance was seen by Cassini in 1672 and 1692; by De la Hire in 1702; and by Mr. Ellis in Hudson's Bay. As M. Feuillée was walking on the banks of the river La Plata, he saw the sun rising over the river, with a luminous tail projecting downwards, which continued till he was **six** degrees high. Paraselæ, or mock moons, have also been seen, accompanied with tails and coloured circles, like those which accompany the parhelia. An account of several, and a particular description of a fine appearance of this kind, may be seen in Muschenbroek.

The following account of this phenomenon is extracted from a pamphlet, entitled, 'Somewhat written by occasion of Three Sunnes' seene, at Tregorie, in Cornwall, the 22nd of December last; with other memorable occurrents in other places. Imprinted 1622: 20 pages small 4to.'

"Since this strange apparition, namely, upon the 10th of January last, there happened in Devonshire, yet not farre from the other place, being on the edge of Cornwalle, another wonder, which, did as much affrighte the eares of men, as this did their eyes: for in the afternoone of that day, being the Thursday after Twelfth-day, there were heard in the aire un-usuall cracks or claps of thunder, resembling in all points the sound of many drums together, sometimes beating charges, sometimes retreats, sometimes marches, and all other points of warre: which, after it had continued a good time, it seemed that the same thunder did most lively expresse many volleyes of small-shot, and afterwards the like volleyes of ordnance, with so great and yet so distinct noyse, that many of them who dwelt neare the sea, went toward the shore to see what it might meane, as verily supposing there had beene some sea fight neere upon that coast. These severall fearfull noyses were againe and againe renewed in the same order, till at

length with an horrible and extraordinary cracke of thunder, there fell in a ground of one Robert Pierce, where there were divers workemen planting apple-trees, (which ground lay neere the house of one Master George Chidley,) a thunder-bolt, if I may so call it, being a stone of three foot and an halfe in length, of two foot and an halfe in breadth, and one foot and an halfe in thicknesse, the substance whereof was in hardnesse and colour not much unlike a flint, as appeares by many pieces thereof, which are shewed up and downe by many credible and honest gentlemen, who, with their own hands, brake them off from the maine stone. After the fall of this stone, which with the weight thereof was cleane buried in the ground above a yard deepe, the thunder ceased, and people began as much to won-at that which they now saw, as they had lately done at that, which with so much feare and amazement they had heard."

Observations on ECLIPSES OF THE SUN AND MOON.—

Give me the ways of wand'ring stars to know,
The depths of heav'n above and earth below;
Teach me the various labours of the Moon,
And whence proceed th' Eclipses of the Sun. *Virg. Georg. li*

The deprivation of the light of the sun, or some heavenly body, by the interposition of another heavenly body between our sight and it is, called an Eclipse. Thus, eclipses of the sun happen by the moon's intervening between it and the earth; by which means the shadow of the moon falls upon the earth, when the latitude of the moon does not prevent it, by elevating her orb above, or depressing it below the earth. On the other hand, an eclipse of the moon can only happen when the earth is interposed between the sun and it; for then, if the latitude of the moon does not prevent it, the shadow of the earth may fall on the moon, and thereby cause either a partial, or total eclipse. A total eclipse of the sun or moon, is when their whole bodies are obscured; and a partial one, is when part only of their bodies is darkened: again, a central eclipse is when it is not only total, but the eclipsed body passes through the centre of the shadow.

As total solar eclipses are by no means common, we shall give an interesting description of one, by Dr. Stukeley, sent to his friend, the celebrated Dr. Edmund Halley.

"According to my promise, I send you what I observed of the solar eclipse, though I fear it will not be of any great use to you. I was not prepared with any instruments for measuring time or the like, and proposed to myself only to watch all the appearances that nature would present to the naked eye upon so remarkable an occasion, and which generally are overlooked, or but grossly regarded. I chose for my station a place called Haradon Hill, two miles eastward from Am-

bury, and full east from the opening of Stonehenge avenue, to which it is as the point of view. Before me lay the vast plain where that celebrated work stands, and I knew that the eclipse would appear directly over it; besides, I had the advantage of a very extensive prospect every way, this being the highest hill hereabouts, and nearest the middle of the shadow. Full west of me, and beyond Stonehenge, is a pretty copped hill, like the top of a cone, lifting itself above the horizon; this is Clay-hill, near Warminster, twenty miles distant, and near the central line of darkness, which must come from thence, so that I could have notice enough beforehand of its approach. Abraham Sturgis and Stephen Ewens, both of this place, and sensible men, were with me. Though it was very cloudy, yet now and then we had gleams of sunshine, rather more than I could perceive at any other place around us. These two persons, looking through smoked glasses, while I was taking some bearings of the country with a circumferentor, both confidently affirmed the eclipse was begun, when, by my watch, I found it just half an hour after five; and accordingly from thence the progress of it was visible, and very often to the naked eye; the thin clouds doing the office of glasses. From the time of the sun's body being half covered, there was a very conspicuous circular iris round the sun, with perfect colours. On all sides we beheld the shepherds hurrying their flocks into fold, the darkness coming on; for they expected nothing less than a total eclipse for an hour and a quarter.

"When the sun looked very sharp like a new moon, the sky was pretty clear in that spot; but soon after a thicker cloud covered it, at which time the iris vanished; the copped hill before-mentioned grew very dark, together with the horizon on both sides, that is, to the north and south, and looked blue, just as it appears at the declension of day. We had scarcely time to tell them, when Salisbury steeple, six miles off southward, became very black; the copped hill was quite lost, and a most gloomy night with full career came upon us: at this instant we lost sight of the sun, whose place among the clouds was hitherto sufficiently distinguishable, but now not the least trace of it was to be found, any more than if really absent: then I saw by my watch, though with difficulty, and only by help of some light from the northern quarter, that it was six hours thirty-five minutes: just before this, the whole compass of the heavens and earth looked of a lurid complexion, properly speaking, for it was black and blue, only on the earth upon the horizon the blue prevailed; there was likewise in the heavens, among the clouds, much green interspersed, so that the whole appearance was really very dreadful, and as symptoms of sickening nature.

"Now I perceived we were involved in total and palpable darkness, as I may aptly call it; for though it came quickly, yet I was so intent, that I could perceive its steps, and feel it as it were drop upon us, and fall on the right shoulder (we looking westward) like a great dark mantle, or coverlet of a bed, thrown over us, or like the drawing of a curtain on that side. The horses we held in our hands were very sensible of it, and crowded close to us, startling with great surprise; and as much as I could see of the men's faces that stood by me, they had a horrible aspect. At this instant I looked around me, not without exclamations of admiration, and could discern colours in the heavens, but the earth had lost its blue, and was wholly black. For some time, among the clouds, there were visible streaks of rays, tending to the place of the sun as their centre; but immediately after, the whole appearance of earth and sky was entirely black: of all things I ever saw in my life, or can by imagination fancy, it was a sight the most tremendous.

"Towards the north-west, whence the eclipse came, I could not in the least find any distinction in the horizon between heaven and earth, for a good breadth of about sixty degrees, or more; nor the town of Ambsbury underneath us, nor scarcely the ground we trod on. I turned myself round several times during this total darkness, and remarked at a good distance from the west on both sides, that is, to the north and south, the horizon very perfectly; the earth being black, the lower parts of the heavens light; for the darkness above hung over us like a canopy, almost reaching the horizon in those parts, or as if made with skirts of a lighter colour; so that the upper edges of all the hills were as a black line, and I knew them very distinctly by their shape or profile; and northward, I saw perfectly, that the interval of light and darkness in the horizon was between Martinsal-hill and St. Ann's-hill; but southward it was more indefinite. I do not mean that the verge of the shadow passed between those hills, which were but twelve miles distant from us; but, so far I could distinguish the horizon; beyond it not at all. The reason of it was this; the elevation of ground I was upon gave me an opportunity of seeing the light of the heavens beyond the shadow; nevertheless, this verge of light looked of a dead yellowish, and greenish colour; it was broader to the north than south; but the southern was of a tawny colour: at this time behind us, or eastward toward London, it was dark too, where otherwise I could see the hills beyond Andover; for the foremost end of the shadow was past thither; so that the whole horizon was now divided into four parts of unequal bulk, and degrees of light and dark; the part to the north-west broadest and blackest, to the south-west lightest and longest. All the change I could perceive

during the totality, was, that the horizon by degrees drew into two parts, light and dark: the northern hemisphere growing still longer, lighter, and broader; and the two opposite dark parts uniting into one, and swallowing up the southern enlightened part.

“As at the beginning the shade came feelingly upon our right shoulders, so now the light from the north, where it opened as it were; though I could discern no defined light or shade upon the earth that way, which I earnestly watched for, yet it was manifestly by degrees, and with oscillation, going back a little, and quickly advancing further, till at length, upon the first lucid point appearing in the heavens, where the sun was, I could distinguish pretty plainly a rim of light running alongside of us a good while together, or sweeping by at our elbows from west to east. Just then, having reason to suppose the totality ended with us, I looked on my watch, and found it to be full three minutes and a half more. Now the hill-tops changed their black into blue again, and I could distinguish an horizon where the centre of darkness was before: the men cried out, they saw the copped-hill again, which they had eagerly looked for; but still it continued dark to the south-east, yet I cannot say that ever the horizon that way was undistinguishable. Immediately we heard the larks chirping, and singing very briskly, for joy of the restored luminary, after all things had been hushed into a most profound and universal silence. The heavens and earth now appeared exactly like morning before sunrise, of a greyish cast, but rather more blue interspersed; and the earth, so far as the verge of the hill reached, was of a dark green, or russet colour.

“As soon as the sun emerged, the clouds grew thicker, and the light was very little amended for a minute or more, like a cloudy morning slowly advancing. After about the middle of the totality, and so after the emersion of the sun, we saw Venus very plainly, but no other star. Salisbury steeple now appeared; but the clouds never removing, we could take no account of it afterwards; but in the evening it lightened very much. I hastened home to write this letter, and the impression was so vivid upon my mind, that I am sure, I could for some days after have written the same account of it, and very precisely. After supper I made a drawing of it from my imagination, upon the same paper on which I had taken a prospect of the country before.

“I must confess to you, that I was (I believe) the only person in England, that regretted not the cloudiness of the day, which added so much to the solemnity of the sight, and which incomparably exceeded, in my apprehension, that of 1715 which I saw very perfectly from the top of Boston

steeples, in Lincolnshire, where the air was very clear; but the night of this was more complete and dreadful: there, indeed, I saw both sides of the shadow come from a great distance, and pass beyond us to a considerable extent; but this eclipse had much more of variety and majestic terror; so that I cannot but felicitate myself upon the opportunity of seeing these two rare accidents of nature, in so different a manner. Yet I should willingly have lost this pleasure, for your more valuable advantage of perfecting the noble theory of the celestial bodies, which, last time, you gave the world so nice a calculation of; and I wish the sky had now as much favoured us for an addition to your honour and great skill, which I doubt not to be as exact in this as before."

We now proceed to describe **THE HALO, OR CORONA; AND SIMILAR APPEARANCES.**—An Halo is a luminous circle surrounding the sun, moon, planets, or fixed stars. Occasionally these circles are white, and sometimes they are coloured like the rainbow. Sometimes one only is visible, and at others several concentric halos appear at the same time. Mr. Huygens observed red next the sun, and a pale blue outwards. Sometimes they are red on the inside, and white on the outside. In France, one was observed in 1683, the middle of which was white; after which followed a border of red, next to it was blue, then green, and the outermost circle was a bright red. In 1728, one was seen of a pale red outwardly, then followed yellow, and then green, terminated by a white. In Holland, M. Muschenbroek says, fifty may be seen in the day-time, almost every year; but they are difficult to be observed, except the eye be so situated, that not the body of the sun, but only the neighbouring parts of the heavens, can be seen. Mr. Middleton says, that this phenomenon is very frequent in North America; for that there is generally one or two about the sun every week, and as many about the moon every month. Halos round the sun are very frequent in Russia. M. Æpinus says, that from the 23d of April, 1758, to the 20th of September, he himself had observed no less than twenty-six, and that he has sometimes seen twice as many in the same space of time.

Similar, in some respects, to the halo, was the remarkable appearance which M. Bouguer describes, as observed on the top of Mount Pichinca, in the Cordilleras. When the sun was just rising behind them, so as to appear white, each of them saw his own shadow projected upon it, and no other. The distance was such, that all the parts of the shadow were easily distinguishable, as the arms, the legs, and the head; but what surprised them most was, that the head was adorned with

a kind of glory, consisting of three or four small concentric crowns, of a very lively colour, each exhibiting all the varieties of the primary rainbow, and having the circle of red on the outside. The intervals between these circles continued equal, though the diameters of them all were constantly changing. The last of them was very faint; and at a considerable distance was another great white circle, which surrounded the whole. This phenomenon never appeared but in a cloud consisting of frozen particles, and never in drops of rain like the rainbow. When the sun was not in the horizon, only part of the white circle was visible, as M. Bouquer frequently observed afterwards. Similar to this curious appearance, was one seen by Dr. McFait in Scotland; who observed a rainbow round his shadow in the mist, when he was upon an eminence above it. In this situation the whole country round seemed buried under a vast deluge, and nothing but the tops of distant hills appeared here and there above the flood. In those upper regions, the air, he says, is at that time very pure and agreeable. At another time he observed a double range of colours round his shadow. The colours of the outermost range were broad and very distinct, and every where about two feet distant from the shadow. Then there was a darkish interval, and after that another narrower range of colours, closely surrounding the shadow, which was very much contracted. He thinks that these ranges of colours are caused by the inflection of the rays of light, the same that occasions the ring of light which surrounds the shadow of all bodies, observed by M. Maraldi, and others.

We next proceed to the phenomenon generally called FALLING OR SHOOTING STAR.—This is a luminous meteor, darting rapidly through the air, and resembling a star falling from the heavens. The explication of this phenomenon had puzzled all philosophers, till the modern discoveries in electricity led to the most probable account of it. Signior Beccari makes it pretty evident, that it is an electrical appearance, and recites the following fact in proof of his opinion. About an hour after sunset, he, and some friends that were with him, observed a falling star directing its course towards them, and apparently growing larger and larger, but it disappeared not far from them. When it vanished, it left their faces, hands, and clothes, with the earth, and all the neighbouring objects, suddenly illuminated with a diffused and lambent light, but not attended with any noise. During their surprise at this appearance, a servant informed them, that he had seen a light shine suddenly in the garden, and especially upon the streams which he was throwing to water it. All these appearances were evidently electrical; and Beccari was

confirmed in his conjecture, that electricity was the cause of them, by the quantity of electric matter which he had seen gradually advancing towards a kite he had elevated, which had very much the appearance of a falling star. Sometimes, also, he saw a kind of glory round the kite, which followed it when it changed its place, but left some light, for a small space of time, in the place it had quitted.

Captain Bagnold says, whilst passing through the straits of Bahama, in the autumn of 1799, he witnessed the following singular atmospheric phenomenon.

"It was a fine star-light morning, about two o'clock, the atmosphere remarkably clear, with a light air from the north-east; the sky to windward, from north-north-east to south-south-east, was illuminated by a profusion of those meteors, vulgarly denominated falling stars, but of a description far more vivid than those usually seen in the higher latitudes; the head of each was an oblong ignited mass, followed by a long luminous tail, which, after three or four seconds, gradually vanished. They were formed, to all appearance, in the air, at an elevation of from thirty-five to sixty-four degrees, none being observed in the zenith, and few to commence nearer the horizon than the first-mentioned angles. At the mean of these elevations, the greatest numbers were seen darting in different directions, forming portions of a large curve, all slightly inclined to the horizon. Multitudes were constantly visible at the same moment, and they succeeded each other so rapidly, that the eye of the spectator was kept in motion between the above points of the compass. In about ten minutes they became less frequent, and at length ceased altogether.

"The apparent distance of this phenomenon would, by a seaman, be estimated at fifteen or twenty miles; and if it really was what I have always considered it, namely, a nocturnal shower of meteoric stones, it was perhaps fortunate for all on board, that we were not within the sphere of its action: whatever it was, never shall I forget the splendour of the spectacle."—See *Humboldt's Personal Narrative*, volume III. page 331, 335.

We close this chapter with AN ACCOUNT OF THREE VOLCANOES IN THE MOON; by Dr. Herschel.

"It will be necessary to say a few words by way of introduction to the account I have to give of some appearances upon the moon. The phenomena of nature, especially those that fall under the inspection of the astronomer, are to be viewed, not only with the usual attention to facts as they occur, but with the eye of reason and experience. In this we are however, not allowed to depart from plain appearances

though their origin and signification should be indicated by the most characterizing features. Thus, when we see on the surface of the moon a great number of elevations, from half a mile to a mile and a half in height, we are strictly entitled to call them mountains; but when we attend to their particular shape, in which many of them resemble the craters of our volcanoes, and thence argue that they owe their origin to the same cause which has modelled many of these, we may be said to see by analogy, or with the eye of reason. Now, in this latter case, though it may be convenient, in speaking of phenomena, to use expressions that can only be justified by reasoning upon the facts themselves, it will certainly be the safest way not to neglect a full description of them, that it may appear to others how far we have been authorized to use the mental eye. This being premised, I may safely proceed to give my observations.

“April 19th, 1787, 10h. 36', sidereal time: I perceive three volcanoes in different places of the dark part of the new moon. Two of them are either already nearly extinct, or otherwise in a state of going to break out; which, perhaps, may be decided next lunation. The third shews an actual eruption of fire, or luminous matter. I measured the distance of the crater from the northern limb of the moon, and found it $3' 57'' 3$. Its light is much brighter than the nucleus of the comet which M. Mechain discovered at Paris the 10th of this month.—April 20th, 1787, 10h. 2', sidereal time: The volcano burns with greater violence than last night. I believe its diameter cannot be less than $3''$, by comparing it with that of the Georgian planet: as Jupiter was near at hand, I turned the telescope to his third satellite, and estimated the diameter of the burning part of the volcano to be equal to at least twice that of the satellite. Hence we may compute that the shining or burning matter must be above three miles in diameter. It is of an irregular round figure, and very sharply defined on the edges. The other two volcanoes are much farther towards the centre of the moon, and resemble large pretty faint nebulæ, that are gradually much brighter in the middle; but no well-defined luminous spot can be discerned in them. These three spots are plainly to be distinguished from the rest of the marks upon the moon; for the reflection of the sun's rays from the earth is, in its present situation, sufficiently bright, with a ten-feet reflector, to shew the moon's spots, even the darkest of them; nor did I perceive any similar phenomena last lunation, though I then viewed the same places with the same instrument.

“The appearance of what I have called the actual fire, or eruption of a volcano, exactly resembled a small piece of burning charcoal, when it is covered by a very thin coat of

white ashes, which frequently adhere to it after it has been some time ignited; and it had a degree of brightness about as strong as that with which such a coal would be seen to glow in faint daylight. All the adjacent parts of the volcanic mountain seemed to be faintly illuminated by the eruption, and were gradually more obscure as they lay at a greater distance from the crater.

"This eruption resembled much that which I saw on the fourth of May, in the year 1783; an account of which, with many remarkable particulars relating to volcanic mountains in the moon, I shall take an early opportunity of communicating to the Royal Society. It differed, however, considerably in magnitude and brightness; for the volcano of the year 1783, though much brighter than that which is now burning, was not near so large in the dimensions of its eruption; the former seen in the telescope resembled a star of the fourth magnitude, as it appears to the natural eye: this, on the contrary, shews a visible disk of luminous matter, very different from the sparkling brightness of starlight."



CHAP. LXIX.

CURIOSITIES RESPECTING VARIOUS PHENOMENA, OR APPEARANCES IN NATURE.—(*Concluded.*)

The Aurora Borealis.

————— Silent from the north
A blaze of meteors shoots: ensweeping first
The lower skies, they all at once converge
High to the crown of heav'n, and all at once
Relapsing quick, as quickly reascend,
And mix and thwart, extinguish and renew,
All ether coursing in a maze of light

Thomson.

THE AURORA BOREALIS, sometimes called Streamers, is an extraordinary meteor, or luminous appearance, shewing itself in the night time in the northern part of the heavens; and most usually in frosty weather. It is generally of a reddish colour, inclining to yellow, and sends out frequent corruscations of pale light, which seem to rise from the horizon in a pyramidical undulating form, and shoot with great velocity up to the zenith. The Aurora Borealis appears frequently in form of an arch, chiefly in the spring and autumn, after a dry year. The arch is partly bright, partly dark, but generally transparent: and the matter of which it consists, is also found to have no effect on rays of light which pass through it.

Dr. Hamilton observes, that he could plainly discern the smallest speck in the Pleiades through the density of those clouds which formed the Aurora Borealis in 1763, without the least diminution of its splendour, or increase of twinkling.

This kind of meteor, which is more uncommon as we approach towards the equator, is almost constant during the long winter, and appears with the greatest lustre in the polar regions. In the Shetland isles, the "Merry Dancers," as the northern lights are there called, are the constant attendants of clear evenings, and afford great relief amidst the gloom of the long winter nights. They commonly appear at twilight, near the horizon, of a dun colour, approaching to yellow; they sometimes continue in that state for several hours, without any perceptible motion; and sometimes they break out into streams of stronger light, spreading into columns, and altering slowly into ten thousand different shapes, and varying their colours from all the tints of yellow, to the most obscure russet. They often cover the whole hemisphere, and then exhibit the most brilliant appearance. Their motions at this time are most amazingly quick; and they astonish the spectator with the rapid changes of their form. They break out in places where none were seen before, skimming briskly among the heavens, are suddenly extinguished, and are succeeded by a uniform dusky tract. This again is brilliantly illuminated in the same manner, and as suddenly left a dark space. In some nights, they assume the appearance of large columns, on one side of the deepest yellow, and on the other, gradually changing, till it becomes undistinguished from the sky. They have generally a strong tremulous motion from one end to the other, and this continues till the whole vanishes.

As for us, who see only the extremities of these northern phenomena, we can have but a faint idea of their splendour and motions. According to the state of the atmosphere, they differ in hue; and sometimes assuming the colour of blood, they make a dreadful appearance. The rustic sages who observe them, become prophetic, and terrify the spectators with alarms of war, pestilence, and famine. Nor, indeed, were these superstitious presages peculiar to the northern islands: appearances of a similar nature are of ancient date; and they were distinguished by the appellations of "phasmata," "trabes," and "balides," according to their forms and colours. In old times they were either more rare, or less frequently noticed: they were supposed to portend great events, and the timid imagination formed of them aerial conflicts.

In the northern latitudes of Sweden and Lapland, the *Auroræ Boreales* are not only singularly beautiful in their appearance, but they afford travellers, by their almost constant effulgence, a very beautiful light during the whole night. In

Hudson's Bay the *Aurora Borealis* diffuses a variegated splendour, which is said to equal that of the full moon. In the north-eastern parts of Siberia, according to the description of Gmelin, these northern lights are observed to "begin with single bright pillars, rising in the north, and almost at the same time in the north-east, which, gradually increasing, comprehend a large space of the heavens, rush about from place to place with incredible velocity, and, finally, almost cover the whole sky up to the zenith, and produce an appearance as if a vast tent were expanded in the heavens, glittering with gold, rubies, and sapphire. A more beautiful spectacle cannot be painted; but whoever should see such a northern light for the first time, could not behold it without terror. For, however fine the illumination may be, it is attended, as I have learned from the relation of many persons, with such a hissing, crackling, and rushing noise through the air, as if the largest fire-works were played off. To describe what they then hear, they make use of the expression, 'The raging host is passing.' The hunters, who pursue the white and blue foxes in the confines of the Icy Sea, are often alarmed in their course by these northern lights. Their dogs are then so much frightened, that they will not move, but lie obstinately on the ground, till the noise has passed. Commonly, clear and calm weather follows this kind of northern lights. This account has been confirmed by the uniform testimony of many, who have spent part of several years in these northern regions, and inhabited different countries from the Yenisei to the Lena; so that no doubt of its truth can remain. This seems, indeed, to be the real birth-place of the *Aurora Borealis*."

A person who resided seven years at Hudson's Bay, confirms M. Gmelin's relation of the fine appearance and brilliant colours of the northern lights, and particularly of their rushing noise, which he affirms he has frequently heard, and he compares it to the sound produced by whirling round a stick swiftly at the end of a string. A similar noise has likewise been noticed in Sweden. Mr. Nairne also, being in Northampton at the time when the northern lights were remarkably bright, is confident he heard a hissing or whizzing sound. Mr. Belknap, of Dover, in New Hampshire, North America, testifies to this fact. M. Cavallo says, that the cracking noise is distinctly audible, and that he has heard it more than once. Similar lights, called *Auroræ Australes*, have been long since observed towards the south pole, and their existence has been lately ascertained by Mr. Forster, who assures us, that in his voyage round the world with Captain Cook, he observed them in high southern latitudes, though attended with phenomena somewhat different from those which are seen here.

On February 17, 1773, in south latitude 58° , "a beautiful phenomenon (he says) was observed during the preceding night, which appeared again this and several following nights. It consisted of long columns of a clear white light, shooting up from the horizon to the eastward, almost to the zenith, and gradually spreading on the whole southern part of the sky. The columns were sometimes bent sideways at their upper extremities; and though in most respects similar to the northern lights (*Aurora Borealis*) of our hemisphere, yet they differed from them in being always of a whitish colour, whereas ours assume various tints, especially those of a fiery and purple hue. The sky was generally clear when they appeared, and the air sharp and cold, the thermometer standing at the freezing point."

The periods of the appearance of these northern lights are very inconstant. In some years they occur very frequently, and in others they are more rare; and it has been observed, that they are more common about the time of the equinoxes than at other seasons of the year. Dr. Halley (see *Philos. Trans.* No. 347, p. 406,) has collected together several observations, which form a kind of history of this phenomenon. After having particularly described the various circumstances which attended that observed by himself, and many others, in March, 1716, and which was singularly brilliant, he proceeds with informing us, that the first account of similar phenomena recorded in the English annals, is that of the appearance noticed January 30, 1560, and called, *Burning Spears*, by the author of a book entitled, "*A Description of Meteors*," by W. F. D.D.; reprinted at London, in 1654. The next appearance of a like kind, recorded by Stow, occurred on October 7, 1564. In 1574, as Camden and Stow inform us, an *Aurora Borealis* was seen for two successive nights, viz. on the 14th and 15th of November, with appearances similar to those observed in 1716, and which are now commonly noticed. The same phenomenon was twice seen in Brabant, in 1575, viz. on the 13th of February, and the 28th of September; and the circumstances attending it were described by Cornelius Gemma, who compares them to "spears, fortified cities, and armies fighting in the air." In the year 1580, M. Masline observed these phasmata, as he calls them, at Baknang, in the county of Wirtemberg, in Germany, no less than seven times in the space of twelve months; and again at several different times, in 1581. On September 2d, 1621, the same phenomenon was seen over all France; and it was particularly described by Gassendus, in his "*Physics*," who gave it the name of *Aurora Borealis*. Another was seen all over Germany, in November, 1623, and was described by Kepler. Since that time, for more than eighty years, we have no account

of any such phenomenon, either at home or abroad. In 1707, Mr. Neve observed one of small continuance in Ireland; and in the same year, a similar appearance was seen by Romer, at Copenhagen; and during an interval of eighteen months, in the years 1707 and 1708, this sort of light had been seen no less than five times.

Hence it should seem, (says Dr. Halley,) that the air or earth, or both, are not at all times disposed to produce this phenomenon, though it is possible it may happen in the day-time, in bright moonshine, or in cloudy weather, and so pass unobserved. Dr. Halley further observes, that the Aurora Borealis of 1716, which he described, was visible from the west of Ireland to the confines of Russia, and to the east of Poland; extending at least near thirty degrees of longitude, and from about the fiftieth degree of north latitude, over almost all the north of Europe; and in all places at the same time, it exhibited appearances similar to those which he observed in London. He regrets, however, that he was unable to determine its height, for want of contemporary observations at different places.

Father Boscovich has determined the height of an Aurora Borealis, observed on the 16th of December, 1737, by the Marquis of Poleni, to have been eight hundred and twenty-five miles; and Mr. Bergman, from a mean of thirty computations, makes the average height of the Aurora Borealis to be seventy-two Swedish, or (supposing a Swedish mile to be about six and a half English miles) four hundred and sixty-eight English miles. Euler supposes the height to be several thousands of miles; and Mairan also assigns to these phenomena a very elevated region, the far greater number of them being, according to him, about two hundred leagues above the surface of the earth. Dr. Blagden, speaking of the height of some fiery meteors, (Phil. Trans. vol. lxxiv. p. 227,) says, "that the Aurora Borealis appears to occupy as high, if not a higher region, above the surface of the earth, as may be judged from the very distant countries to which it has been visible at the same time:" he adds, that "the great accumulation of electric matter seems to lie beyond the verge of our atmosphere, as estimated by the cessation of twilight." But as it is difficult to make such observations on this phenomenon as are sufficient to afford a just estimate of its altitude, they must be subject to considerable variation, and to material error.

Dr. Blagden informs us, that instances are recorded, in which the northern lights have been seen to join, and form luminous balls, darting about with great velocity, and even leaving a train behind them like the common fire-balls. This ingenious author, however, conjecturing that distinct regions

are allotted to the electrical phenomena of our atmosphere, assigns the appearance of fire-balls to that region which lies beyond the limits of our crepuscular atmosphere; and a greater elevation above the earth, to that accumulation of electricity in a lighter and less condensed form, which produces the wonderfully diversified streams and coruscations of the Aurora Borealis.

CHAP. LXX.

CURIOSITIES RESPECTING GALVANISM.

“Nature, exhaustles still, has power to warm,
And every change presents a novel charm.”

GALVANI, a professor of anatomy in the university of Bologna, was one day making experiments on electricity. In his laboratory, near the machine, were some frogs that had been flayed; the limbs of which became convulsed every time a spark was drawn from the apparatus. Galvani, surprised at this phenomenon, made it a subject of investigation, and discovered that metals, applied to the nerves and muscles of these animals, occasioned powerful and sudden contractions, when disposed in a certain manner. He gave the name of Animal Electricity to this order of new phenomena, from the analogy that he considered existing between these effects and those produced by electricity.

The name, Animal Electricity, has been superseded, notwithstanding the great analogy that exists between the effects of electricity and of Galvanism, in favour of the latter term; which is not only applicable to the generality of the phenomena, but likewise serves to perpetuate the memory of the discoverer.

In order to give rise to galvanic effects, it is necessary to establish a communication between two points of one series of nervous and muscular organs. In this manner a circle is formed, one arch of which consists of the animal parts, rendered the subject of experiment, while the other arch is composed of exciting instruments, which generally consists of those animal parts called supporters; others, destined to establish a communication between the latter, are called conductors. To form a complete galvanic circle, take the thigh of a frog, deprived of its skin; detach the crural nerve, as far as the knee; put it on a piece of zinc; lay the muscles of the leg on a piece of silver; then finish the exciting arch, and complete the galvanic circle by establishing a communication

by means of the two supporters, by iron or copper wire, pewter, or lead. The instant that the communicators touch the two supporters, a part of the animal arch formed by the two supporters will be convulsed. Although this disposition of the animal parts, and of galvanic instruments, be most favourable to the development of the phenomena, yet the composition of the animal and excitatory arch may be much varied. Thus contractions are obtained, by placing the two supporters under the nerve, and leaving the muscle out of the circle; which proves that nerves essentially constitute the animal arch.

It is not necessary for nerves to be entire, in order to produce contractions. They take place whether the organs be tied or cut through, provided there exists a simple contiguity between the divided ends. This proves that we cannot strictly conclude what happens in muscular action, from that which takes place in galvanic phenomena; since, if a nerve be tied or divided, the muscles on which the energy is distributed lose the power of action.

The cuticle is an obstacle to galvanic effects; they are always feebly manifested in parts covered by it. When it is moist, fine, and delicate, the effect is not entirely interrupted. Humboldt, after having detached the cuticle from the posterior part of the neck and back, by means of two blisters, applied plates of metal to the bare cutis, and, at the moment of establishing a communication, he experienced sharp prickings, accompanied with a serosanguinous discharge.

If a plate of zinc be placed under the tongue, and a flat piece of silver on its superior surface, on making them touch each other, an acerb taste will be perceived, accompanied with a slight trembling.

The exciting arch may be constructed with two or three metals, or even one metal only; with alloys, amalgams, or other metallic or mineral combinations, carbonated substances, &c. It is observed, that metals, which are in general the most powerful exciters, induce contractions so much the more as they have an extent of surface. Metals are all more or less excitants; and it has been noticed that zinc, gold, silver, and pewter, are of the highest rank; then copper, lead, nickel, antimony, &c.

Galvanic susceptibility is exhausted by too long-continued exercise, and is recruited by repose. Immersion of nerves in alcohol and opiate solutions diminishes, and even destroys, this susceptibility; in the same manner, doubtless, as the immoderate use of these substances in the living man, blunts, and induces paralysis in muscular action. Immersion in oxygenated muriatic acid, revests the fatigued parts, in being acted on by the stimulus. Animals killed by the repeated

discharge of an electric battery, acquire an increase of galvanic susceptibility; and this property subsists unchanged in animals destroyed by submersions in mercury, pure hydrogen gas, azote, and ammoniac; and finally, it is totally annihilated in animals suffocated by the vapour of charcoal.

Galvanic susceptibility is extinct in the muscles of animals of warm blood, in proportion as vital heat is dissipated; sometimes even when life is terminated in convulsions, contractibility cannot be put into action, although warmth be not completely gone, as though the vital property were consumed by the convulsions amidst which the animals had expired. In those of cold blood, on the contrary, it is more durable. The thighs of frogs, long after being separated from every thing, and even to the instant of incipient putrefaction, are influenced by galvanic stimuli; doubtless, because irritability, in these animals, is less intimately connected with respiration, and life more divided among the different organs, which have less occasion to act on each other for the execution of its phenomena. The galvanic chain does not produce sensible actions (that is, contractions) until the moment it is completed, by establishing a communication with the parts constituting it. During the time it is complete, that is, throughout the whole space of time that the communication remains established, every thing remains tranquil; nevertheless, galvanic influence is not suspended; in fact, excitability is evidently increased or diminished, in muscles that have been long continued in the galvanic chain, according to the difference of the reciprocal situation of the connecting metals.

If silver has been applied to the nerves, and zinc to the muscles, the irritability of the latter increases in proportion to the time they have remained in the chain. By this method, the thighs of frogs have been revived in some degree, and afterwards became sensible to stimuli that before had ceased to act on them. By distributing the metals in an inverse manner, applying zinc to the nerves, and silver to the muscles, an effect absolutely contrary is observed; and the muscles that possessed the most lively irritability when placed in the chain, seem to be rendered entirely paralytic if they remain long in this situation.

This difference evidently depends on the direction of the galvanic fluid, determined towards the muscles or nerves, according to the manner in which these metals are disposed; and this is of some importance to be known for the application of galvanic means to the cure of diseases.

M. Volta's apparatus is as follows:—Raise a pile, by placing a plate of zinc, a flat piece of wet card, and a plate of silver, successively; then a second piece of zinc, &c. until the elevation is several feet high; for the effects are greater

in proportion to its height; then touch both extremities of the pile, at the same instant, with one piece of iron wire: at the moment of contact, a spark is excited from the extremities of the pile, and luminous points are often perceived at different heights, where the zinc and silver come into mutual contact. The zinc end of this pile appears to be negatively electrified; that formed by the silver, on the contrary, indicates marks of positive electricity.

If we touch both extremities of the pile, after having dipped our hands into water, or, what is better, a saline solution, a commotion, followed by a disagreeable pricking in the fingers and elbow, is felt.

If we place, in a tube filled with water, and hermetically closed by two corks, the extremities of two wires of the same metal, which are in contact at the other extremity, one with the summit, the other with the base of the pile; these ends, even when separated only by the space of a few lines, experience evident changes at the instant the extremities of the pile are touched: the wire in contact with that part of the pile composed of zinc, becomes covered with bullæ of hydrogen gas; that which touches the extremity formed by silver, becomes oxydated. Fourcroy attributes this phenomenon to the decomposition of water by the galvanic fluid, which abandons the oxygen to the iron that touches the positive extremity of the pile; then conducts the other gas invisibly to the end of the other wire, there to be disengaged.

From the numerous experiments of Mr. Davy, many new and important facts have been established, and Galvanism has been found to be one of the most powerful agents in chemistry. By its influence, platina wire has been melted; gold, silver, copper, and most of the metals, have easily been burnt! the fixed alkalis, and many of the earths, have been made to appear as consisting of a metallic base and oxygen; compound substances, which were before extremely difficult to decompose, are now, by the aid of Galvanism, easily resolved into their constituent

CHAP. LXXI.

CURIOSITIES RESPECTING MAGNETISM

Almighty Cause! 'tis thy preserving care
 That keeps thy works for ever fresh and fair:
 Hence life acknowledges its glorious Cause,
 And matter owns its great Disposer's laws;
 Hence flow the forms and properties of things;
 Hence rises harmony, and order springs.
 Thy watchful providence o'er all intends;
 Thy works obey their great Creator's ends.
 Thee, Infinite! what finite can explore!
 Imagination sinks beneath thy power.
 Yet present to all sense that power remains,
 Reveal'd in nature, Nature's Author reigns.

Boyc.

The obedient steel with living instinct moves,
 And veers for ever to the pole it loves,
 So turns the faithful needle to the pole,
 Tho' mountains rise between, and oceans roll.

Darwin

MAGNETISM is supposed to have been first rendered useful about the end of the twelfth, or at least very early in the thirteenth, century, by John de Gioja, a handicraft of Naples, who noticed the peculiar attraction of metals, and iron in particular, towards certain masses of rude ore; the touch of which communicated to other substances of a ferruginous nature, especially iron or steel bars, the property of attraction: these touched bars he observed to have a peculiar and similar tendency towards one particular point; that when suspended in equilibrio, by means of threads around their centres, they invariably turned towards the same point; and that, when placed in a row, however adversely directed, they soon disposed themselves in perfectly parallel order. In this instance he improved upon the property long known to, but not comprehended or applied to use by, the ancients, who considered the loadstone simply as a rude species of iron ore, and curious only so far as it might serve to amuse.

Gioja being possessed of a quick understanding, and of a strong mind, was not long in further ascertaining the more sensible purposes to which the magnet might be appropriated. He accordingly fixed various magnets upon pivots, supporting their centres in such a manner as allowed the bars to traverse freely. Finding that, however situated within the reach of observation and comparison, they all had the same tendency, he naturally concluded them to be governed by some attraction, which might be ultimately ascertained and acted upon. He therefore removed into various parts of Italy, to satisfy himself whether or not the extraordinary

impulse which agitated these bars, that had been magnetized by friction, existed only in the vicinity of Naples, or was general. The result of his researches appears to be, that the influence was general, but that the magnets were rendered extremely variable, and fluctuated much, when near large masses of iron. The experiments of Gioja gave birth to many others, and at length to a trial of the magnetic influence on the surface of the water. To establish this, a vessel was moored out at sea, in a direction corresponding with that of the magnet; and a boat, having a magnet equipoised on a pivot at its centre, was sent out at night in the exact line indicated thereby; which, being duly followed, carried them close to the vessel that was at anchor. Thus the active power of attraction appeared to be established on both elements, and in the course of time the magnet was fixed to a card, marked with thirty-two points, whereby the mariner's compass was presented to us. The points to which the magnet always turned itself, being generally in correspondence with the meridian of the place where it acted, occasioned the extremities of the bars to be called poles. Succeeding experiments proved, that the magnetic bar never retained an exactly horizontal position; but that one of its poles invariably formed an angle with any perfect level, over which it was placed: this was not so very measurable in a short bar, but in one of a yard in length was formed to give several degrees of inclination. This, which is called "the dip of the needle," (or magnet,) seems to indicate that the attracting power is placed within the earth. What that attracting power is, we cannot determine; some consider it to be a fluid, while others conjecture it to be an immense mass of loadstone, situated somewhere about the north pole. The difficulty is, however, considerably increased by the known fact of the needles of compasses not always pointing due north; but in many places varying greatly from the meridional lines respectively; and from each other at different times and places.

The facility with which a meridional line may be drawn by solar observation, and especially by taking an azimuth, fortunately enables navigators to establish the variation between the true northern direction, and that indicated by the magnet attached to the card of the compass. Nevertheless, we have great reason to believe, that, for want either of accurate knowledge of the prevalent variations, or from inattention thereto, many vessels, of which no tidings were ever heard, have been cast away; it being obvious, that a false indication of the northern point, in many places amounting to nearly the extent of twenty-five degrees, must produce so important an error in a vessel's course, as to subject her to destruction on those very shoals, rocks, &c. of which the navigator unhappily

thinks he steers perfectly clear. To obviate such danger, as far as possible, all modern sea-charts have the variations of the compass in their several parts duly noted down; and in reckoning upon the course steered by the compass, an allowance is usually made for the difference between the apparent course by the compass, and the real course, as ascertained by celestial observation. Under circumstances so completely contradictory, the principle of magnetism must remain unknown: we know not of any hypothesis which strikes conviction on our minds, or which seems to convey any adequate idea of the origin, or *modus operandi*, of this wondrous influence. All we can treat of is, the effect; also of the appearances which guide our practice, and of the manner in which the attractive power may be generated and increased. In regard to the latter point, namely, the generation and increase of the magnetic attraction, we shall endeavour to give a brief but distinct view of what relates thereto: observing, that where volcanic eruptions are frequent, and in those latitudes where the Aurora Borealis is distinctly seen, the needle or magnet is sensibly affected.

Previously to earthquakes, as well as during their action, and while the northern lights are in full display, no reliance can be placed on the compass; the card of which will appear much agitated. This has given rise to the opinion held by some, that the power is a fluid: to this, however, there appear so many objections, that we are more disposed to reject than to favour it, although under the necessity of confessing, that we are not able to offer one that may account satisfactorily for the various phenomena attendant upon magnetism.

We have already stated, that every magnet has two poles; that is, one end is called the north, the other the south pole: the former being considered as capable of attraction; the other, as we shall infer from the subjoined explanations, being far more inert, if at all possessed of an attractive power. When two magnets are brought together with their north poles in contact, they will, instead of cohering, be obviously repelled to a distance corresponding with their respective powers of attraction, when applied individually to unmagnetized needles. The south poles will, in like manner, repel each other; but the north pole of one, and the south pole of the other, will, when approximated, be evidently attracted, and will cohere so as to sustain considerable weights. Iron is the only metal, hitherto known, which is capable of receiving and communicating the magnetic power; but quiet, and the absence of contact, in some respects, are indispensably necessary towards its perfect retention. Thus, when a bar has been impregnated, however abundantly, with the magnetic

principle, if it be heated or hammered, the power of attraction will be dissipated; or if a tube filled with iron filings have their surface magnetized, by shaking the tube the magnetic influence will likewise be lost. In some respects the magnetic influence resembles caloric; for it very rapidly communicates to iron, devoid of magnetism, a certain portion of its own powers; which, however, appear to be reproduced instantaneously. As various small fires under one large vessel will thereby heat it, and cause the water it contains to boil, though neither of them individually would produce that effect; so, many weak magnets may, by being united, communicate a power equal to its own, and be made to create an accumulated power, larger than that contained by either of them individually.

There is, however, a seeming contradiction to be found in some authors, who recommend that the weakest magnets should be first applied,—and those more forcible, in succession, according to the power they may possess; the reason assigned being, that the weaker magnets would else, in all probability, draw off some of the accumulated power from the new magnet. But of this there appears no danger, since experience proves that magnets rather gain than lose efficiency by contact, not only with each other, but even with common iron. In fact, the magnetic power may at any time be created by various means: the friction of two pieces of flat and polished bars of iron, will cause them for a short time to attract and to suspend light weights. Soft iron is more easily influenced, but steel will retain the influence longer. Lightning, electricity, and galvanism, being all of the same nature, equally render iron magnetic. It is also peculiar, that when two or more magnets are left for any time with their several north poles in contact, the whole will be thereby weakened; whereas, by leaving a piece of common iron attached to a magnet, the latter will acquire strength. It is also well known that some pieces of steel quickly receive the magnetic influence, while others require considerable labour, and after all are scarcely impregnated. The oxide of iron cannot be impregnated, and those bars that have been so, when they become partially oxydized, lose their power. Hence we see the necessity of preserving the needles of compasses from rust.

Magnets have the power to act notwithstanding the intervention of substances in any degree porous between them and the body to be acted upon: thus, if a needle be put on a sheet of paper, and a magnet be drawn under it, the needle will follow the course of the magnet. The peculiar affinity of the loadstone for iron, is employed with great success, by those who work in precious metals, for the separation of filings, &c. of iron from the smaller particles of gold, &c. A magnet

being dipped into the vessel, in which the whole are blended, will attract all ferruginous particles.

To communicate the magnetic power to a needle, let it be placed horizontally; and with a magnet in each hand, let the north pole of one, and the south pole of the other, be brought obliquely in contact over the centre of the needle: draw them asunder, taking care to press firmly, and preserving the same angle or inclination to the very ends of the needles, which should be supported by two magnets, whose ends ought to correspond in polarity with those of the needle. Observe to carry the magnets you press with clear away from the ends of the needle, at least a foot therefrom; repeat the friction in the same manner several times, perhaps six, eight, or ten, and the needle will be permanently magnetized; and, as we have already stated, by using other magnets in succession, the powers of the needle will be proportionably increased.

But no effect will result from the friction if the bars are rusty, or, indeed, not highly polished; their angles must be perfect, and their several sides and ends completely flat. It is, perhaps, one of the most curious of the phenomena attendant on this occult property, that the centre of every magnet is devoid of attraction; yet, that when a needle is placed in a line with a magnet, and within the influence of its pole, that needle almost becomes magnetic, or rather, a conductor, possessing a certain portion of attractive power: and it is no less extraordinary, that the magnet retains its power even in the exhausted receiver of an air-pump; which seems to be a formidable objection to its being influenced by any fluid. Perhaps the opinion entertained by many of our most popular lecturers on this subject, viz. that the earth itself is the great attractor, may be nearest the truth. We are the more inclined towards such an hypothesis, knowing that, at the true magnetic equator, the needle does not dip; and from the well-ascertained fact, that bars of iron, placed for a length of time exactly perpendicular, receive a strong magnetic power, their lower ends repelling the south, but attracting the north poles of magnets applied to them respectively. The direction of the dipping needle was ascertained by one Robert Norman, about two hundred and fifty years ago. He suspended a small magnetic needle, by means of a fine thread round its centre, so as to balance perfectly, over a large magnet: the south pole of the former was instantly attracted by the north pole of the latter. He found, that so long as the needle was held exactly central, at about two inches above the magnet, it remained horizontal; but so soon as withdrawn a little more towards one end than the other of the magnet, the equilibrium was destroyed, and that pole of the needle which was nearest to either pole of the magnet was instantly

attracted, and pointed downwards thereto. By the magnetic equator, we mean a circle passing round the earth at right angles with the magnetic poles, which do not correspond with the geographical poles, as may be fully understood by the indications of all compasses to points differing from the latter; and as the indications of compasses vary so much both at different times and places, we may reasonably conclude, that the magnetic poles are not fixed. The variation of the dipping-needle has not, in our latitude at least, varied more than half a degree since its depressive tendency was first discovered by Norman.

By means of the mariner's compass,

Tall navies hence their doubtful way explore,
And ev'ry product waft from ev'ry shore;
Hence meagre want expell'd, and sanguine strife,
For the mild charms of cultivated life. *Blacklock.*

CHAP. LXXII.

CURIOSITIES RESPECTING THE ARTS, &c.

*Early Invention of several useful Arts—Automaton—Androides—
Extraordinary Pieces of Clockwork—Heidelberg Clock—
Strasburg Clock—Clepsydra—Invention of Watches.*

What cannot art and industry perform,
When science plans the progress of their toil!
They snile at penury, disease, and storm;
And oceans from their mighty mounds recoil.
When tyrants scourge, or demagogues embroil
A land, or when the rabble's headlong rage
Order transforms to anarchy and spoil;
Deep vers'd in man, the philosophic sage
Prepares with lenient hand their frenzy t' assuage;
'Tis he alone, whose comprehensive mind,
From situation, temper, soil, and clime
Explor'd, a nation's various pow'rs can bind,
And various orders, in one form sublime
Of polity, that 'midst the wrecks of time,
Secure shall lift its head on high, nor fear
Th' assault of foreign or domestic crime,
While public faith, and public LOVE sincere,
And industry and law maintain their sway severe. *Beattie.*

EARLY INVENTION OF SEVERAL USEFUL ARTS.—Some useful arts must be nearly coeval with the human race; for food, clothing, and habitation, even in their original simplicity, require some display of ingenuity. Many arts are of

such antiquity as to place the inventors beyond the reach of tradition; while several have gradually crept into existence without an inventor. The busy mind, however, accustomed to date the progress of science from some particular era, cannot rest till it finds or conjectures a beginning to every art. In all countries where the people are illiterate, the progress of arts is extremely slow. It is vouched by an old French poem, that the virtues of the loadstone were known in France before the year 1180. The mariner's compass was exhibited at Venice, A. D. 1260, by Paulus Venetus, as his own invention. John Goya, of Amalphi, was the first, who, many years afterwards, used it in navigation, and also passed for being the inventor. Though it was used in China for navigation long before it was known to the western nations, yet to this day it is not so perfect as in Europe. Instead of suspending it in order to make it act freely, it is placed upon a bed of sand, by which every motion of the ship disturbs its operation.

Hand-mills, termed *querns*, were early used for the grinding of corn; and when corn came to be raised in greater quantities, horse-mills succeeded. Water-mills for grinding corn are described by Vitruvius. Windmills were known in Greece and Arabia, so early as the seventh century; and yet no mention is made of them in Italy till the fourteenth. That they were not known in England in the reign of Henry VIII. appears from a household book of an earl of Northumberland, contemporary with that king, stating an allowance for three mill horses, "two to draw in the mill, and one to carry stuff to the mill." Water-mills for corn must in England have been of a late date.

The ancients had mirror glasses, and employed glass to imitate crystal vases and goblets; yet they never thought of using it in windows. In the thirteenth century, the Venetians were the only people who had the art of making crystal glass for mirrors. A clock that strikes the hours was unknown in Europe till the end of the twelfth century. And hence the custom of employing men to proclaim the hours during night; which to this day continues in Germany, Flanders, and England. Galileo was the first who conceived an idea that a pendulum might be useful for measuring time; and Huygens was the first who put the idea in execution, by making a pendulum clock. Hook, in 1660, invented a spiral spring for a watch, though a watch was far from being a new invention. Paper was made no earlier than the fourteenth century; and the invention of printing was a century later. Silk manufactures were long established in Greece, before silk-worms were introduced there. The manufacturers were provided with raw silk from Persia; but that commerce being frequently interrupted by war, two monks, in the reign of Justinian, brought

eggs of the silk-worm from Hindoostan, and taught their countrymen the method of managing them.

The art of reading made a very slow progress. To encourage that art in England, the capital punishment for murder was remitted, if the criminal could but read, which in law language is termed *benefit of clergy*. One would imagine that the art must have made a very rapid progress when so greatly favoured: but there is a signal proof of the contrary, for so small an edition of the Bible as six hundred copies, translated into English in the reign of Henry VIII. was not wholly sold off in three years. The people of England must have been profoundly ignorant in Queen Elizabeth's time, when a forged clause, added to the twentieth article of the English creed, passed unnoticed till about sixty years ago.

The discoveries of the Portuguese on the west coast of Africa, afford a remarkable instance of the slow progress of the arts. In the beginning of the fifteenth century, they were totally ignorant of that coast beyond Cape Non, in 28 degrees, north latitude. In 1410, the celebrated Prince Henry of Portugal fitted out a fleet for discoveries, which proceeded along the coast to Cape Bajadore, in 26 degrees, but had not courage to double it: and seventy-six years elapsed before this was done by Bartholomew Diaz, in 1486!

Description of AN AUTOMATON.—This is a machine, so constructed by means of weights, levers, springs, wheels, &c. as to move for a considerable time, as if it were endued with animal life. According to this definition, clocks, watches, and all machines of that kind, may be ranked as a species of automata. But the word is most commonly applied to such machines as are made in the form of men and other animals, at the same time that their internal machinery is so contrived, that they seem voluntarily to act like the animals they represent. Archytas of Tarentum, who lived A. C. 400, is said to have made a wooden pigeon that could fly. It is also recorded, that Archimedes made similar automata; that Regiomontanus made a wooden eagle, which flew forth from the city of Nuremburg, met the emperor, saluted him, and returned; also that he made an iron fly, which flew out of his hand at a feast, and returned again after flying about the room. Dr. Hook made the model of a flying chariot, capable of supporting itself in the air. Many other surprising automata have been exhibited in the present age. M. Vaucanson made a duck, which could eat, drink, and imitate exactly the voice of a natural one; and what is still more surprising, the food it swallowed was evacuated in a digested state, or at least considerably altered, on the principles of solution. The

wings, viscera, and bones, were so formed, as greatly to resemble those of a living duck; and the actions of eating and drinking shewed the strongest resemblance, even to muddling the water with its bill.

M. de Droz, of la Chaux de Fonds, in the province of Neuchatel, has also executed some curious pieces of mechanism. One was a clock, presented to the king of Spain, which had, among other curiosities, a sheep that imitated the bleating of a natural one, and a dog that watched a basket of fruit, and which barked and snarled if any one attempted to take it away; if it was actually taken, it would bark till it was restored. A son of this gentleman has also made some extraordinary pieces, particularly an oval gold snuff-box, about four inches long, three broad, and one and a half thick. It is double, having an horizontal partition, with a lid to each of its parts. One contains snuff; but in the other, as soon as the lid is opened, there rises up a very small bird, (for it is only three-quarters of an inch from the beak to the extremity of the tail,) of green-enamelled gold, sitting on a gold stand, which immediately wagging its tail and shaking its wings, and opening its bill of white-enamelled gold, pours forth a clear melodious song, capable of filling a room of twenty or thirty feet square with its melody. The same gentleman exhibited an automaton in England, of the figure of a man, as large as life. It held in its hand a metal style, under which was a card of Dutch vellum. A spring was then touched, and the internal machinery being thus set a-going, the figure began to draw elegant portraits, and likenesses of the king and queen facing each other; and it was curious to observe, with what precision the figure lifted up its pencil, in the transition of it from one point of the picture to another, without making the least blunder whatever; for instance, in passing from the forehead to the eye, nose, and chin, or from the waving curls of the hair to the ear, &c. The first card being finished, the figure rested, until a second was completed, and so on through five separate cards put to it, on all of which it delineated different subjects, but five or six was the extent of its surprising powers.

ANDROIDES.—This is an automaton, in the figure of a man, which, by virtue of certain springs, &c. duly contrived, walks, and performs other external functions of a man. Albertus Magnus is recorded as having made a famous androides, which is said not only to have moved, but to have spoken. Thomas Aquinas is said to have been so frightened when he saw this head, that he broke it to pieces; upon which Albert exclaimed, "*Periit opus triginta annorum!*"

Artificial puppets, which, by internal springs, run upon

a table, and, as they advance, move their heads, eyes, or hands, were common among the Greeks, and from thence they were brought to the Romans. Figures, or puppets, which appear to move of themselves, were formerly employed to work miracles; but this use is now superseded, and they serve only to display ingenuity, and to answer the purposes of amusement. One of the most celebrated figures of this kind, was constructed and exhibited at Paris, in 1738; and a particular account of it was published in the memoirs of the academy for that year. This figure represents a flute-player, which was capable of performing various pieces of music, by wind issuing from its mouth into a German flute, the holes of which it opened and shut with its fingers: it was about five and a half feet high, placed upon a square pedestal four and a half feet high, and three and a half broad. The air entered the body by three separate pipes, into which it was conveyed by nine pairs of bellows, that expanded and contracted, in regular succession, by means of an axis of steel turned by clock-work. These bellows performed their functions without any noise, which might have discovered the manner by which the air was conveyed to the machine.

The three tubes, which received the air from the bellows, passed into three small reservoirs in the trunk of the figure. Here they united, and, ascending towards the throat, formed the cavity of the mouth, which terminated in two small lips, adapted in some measure to perform their proper functions. Within this cavity was a small moveable tongue, which by its motion, at proper intervals, admitted the air, or intercepted it in its passage to the flute. The fingers, lips, and tongue, derived their proper movements from a steel cylinder, turned by clock-work. This was divided into fifteen equal parts, which, by means of pegs, pressing upon the ends of fifteen different levers, caused the other extremities to ascend. Seven of these levers directed the fingers, having wires and chains fixed to their ascending extremities, which, being attached to the fingers, made them to ascend in proportion as the other extremity was pressed down by the motion of the cylinder, and *vice versâ*; then the ascent or descent of one end of a lever produced a similar ascent or descent in the corresponding fingers, by which one of the holes of the flute was occasionally opened or stopped, as it might have been by a living performer. Three of the levers served to regulate the ingress of the air, being so contrived as to open and shut, by means of valves, the three reservoirs above-mentioned, so that more or less strength might be given, and a higher or lower note produced, as occasion required. The lips were, by a similar mechanism, directed by four levers, one of which opened them, to give the air a freer passage, the other contracted them,

the third drew them backward, and the fourth pushed them forward. The lips were projected upon that part of the flute which receives the air, and, by the different motions already mentioned, modified the tune in a proper manner. The remaining lever was employed in the direction of the tongue, which it easily moves so as to shut or open the mouth of the flute. The just succession of the several motions, performed by the various parts of this machine, was regulated by the following simple contrivance.

The extremity of the axis of the cylinder terminated on the right side by an endless screw, consisting of twelve threads, each placed at the distance of a line and a half from the other. Above this screw was fixed a piece of copper, and in it a steel pivot, which, falling in between the threads of the screw, obliged the cylinder to follow the threads; and, instead of turning directly round, it was continually pushed to one side. Hence, if a lever was moved, by a peg placed on cylinder, in any one revolution, it could not be moved by the same peg in the succeeding revolution, because the peg would be moved a line and a half beyond it by the lateral motion of the cylinder.

Thus, by an artificial disposition of these pegs in different parts of the cylinder, the statue was made, by the successive elevation of the proper levers, to exhibit all the different motions of a flute-player, to the admiration of every one who saw it. Another figure, constructed by the same artist, Vaucanson, played on the shepherd's pipe, held in its left hand, and with the right beat upon a drum.

The performances of Vaucanson were imitated, and even exceeded, by M. de Kempelin, of Presburg, in Hungary. The androides constructed by this gentleman in 1769, was capable of playing at chess. It was first brought over to England in 1783, and has often been exhibited since that period. It is thus described: The figure is as large as life, in a Turkish dress, seated behind a table, with doors three and a half feet long, two deep, and two and a half high. The chair on which it sits is fixed to the table, which is made to run on four wheels. It leans its right arm on the table, and in its left hand holds a pipe; with this hand it plays after the pipe is removed. A chess-board of eighteen inches is fixed before it. The table, or rather chest, contains wheels, levers, cylinders, and other pieces of mechanism, all of which are publicly displayed. The vestments of the figure were then lifted over its head, and the body was seen full of similar wheels. There is a little door in its thigh, which is likewise opened: and with this, and the table also open, and the figure uncovered, the whole is wheeled about the room. The doors are then shut, and the automaton is ready to play; but it always takes the

first move. At every motion the wheels are heard; the image moves its head, and looks over every part of the chess-board. When it checks the queen, it shakes its head twice; and thrice in giving check to the king. It likewise shakes its head when a false move is made, replaces the piece, and makes its own move, by which means the adversary loses one. M. de Kempelin exhibited his automaton at Petersburg, Vienna, Paris, and London, before thousands, many of whom were mathematicians, and chess players, and yet the secret by which he governed the motion of its arm was never discovered. He valued himself upon the construction of a mechanism, by which the arm could perform ten or twelve moves. It then needed to be wound up like a watch, after which it was capable of continuing the same number of motions. This automaton could not play unless M. de Kempelin, or his assistant, was near it to direct its movements. A small square box was frequently consulted by the exhibiter during the game, and in this consisted the secret, which the inventor declared he could communicate in a moment. Any person who could beat M. de Kempelin at chess, was sure of conquering the automaton.

EXTRAORDINARY PIECES OF CLOCK-WORK.—Amongst the modern clocks, those at Strasburg and Lyons are very eminent for the richness and variety of their furniture, and for their motions and figures. In the former, a cock claps his wings, and proclaims the hour, and an angel opens a door, and salutes the Virgin; while the Holy Spirit descends on her, &c. In the latter, two horsemen encounter, and beat the hour on each other; a door opens, and there appears on the theatre the Virgin, with Jesus Christ in her arms; the Magi, with their retinue, marching in order, and presenting their gifts; two trumpeters sounding all the while to proclaim the procession.

These, however, are excelled by two which were lately made by English artists, and sent as a present from the East India Company to the Emperor of China. These clocks are in the form of chariots, in which are placed, in a fine attitude, a lady, leaning her right hand upon a part of the chariot, under which is a clock of curious workmanship, little larger than a shilling, that strikes and repeats, and goes eight days. Upon her finger sits a bird finely modelled, and set with diamonds and rubies, with its wings expanded in a flying posture, and it actually flutters for a considerable time on touching a diamond button below it; the body of the bird (which contains part of the wheels that in a manner give life to it) is not the bigness of the 16th part of an inch. The lady holds in her left hand a gold tube not much thicker than

a large pin, on the top of which is a small round box, to which a circular ornament, set with diamonds not larger than a sixpence, is fixed, which goes round nearly three hours in a constant regular motion. Over the lady's head, supported by a small fluted pillar not bigger than a quill, are two umbrellas, under the largest of which a bell is fixed, at a considerable distance from the clock, and seems to have no connection with it; but from which a communication is secretly conveyed to a hammer that regularly strikes the hour, and repeats the same to the clock below. At the feet of the lady is a golden dog; before which, from the point of the chariot, are two birds fixed on spiral springs, the wings and feathers of which are set with stones of various colours, and appear as if flying away with the chariot, which, from another secret motion, is continued to run in a straight, circular, or any other direction; while a boy that lays hold of the chariot behind, seems also to push it forward. Above the umbrella are flowers and ornaments of precious stones; and it terminates with a flying dragon set in the same manner. The whole is of gold, most curiously executed, and embellished with rubies and pearls.

HEIDELBERG CLOCK.—At Heidelberg, in Germany, upon the town-house, was a clock with divers motions; and when the clock struck, the figure of an old man pulled off his hat, a cock crowed, and clapped his wings, soldiers fought with one another, &c.: but this curious piece of workmanship, with the castle and town, were burnt by the French, who committed at the same time the most inhuman barbarities upon the people, when they took those garrisons, in the year 1693.

STRASBURG CLOCK.—At Strasburg, there is a clock, of all others the most famous, invented by Conradus Dasipodius, in the year 1573. Before the clock stands a globe on the ground, shewing the motions of the heavenly bodies. The heavens are carried about by the first mover, in twenty-four hours; Saturn, by his proper motion, is carried about in thirty years; Jupiter in twelve, Mars in two, the Sun, Mercury, and Venus, in one year; and the Moon in one month. In the clock itself there are two tables on the right and left hand, shewing the eclipses of the Sun and Moon from the year 1573, to the year 1624. The third table in the middle is divided into three parts. In the first part, the statue of Apollo and Diana shews the course of the year, and the day thereof, being carried about in one year; the second part shews the year of our Lord, and the equinoctial days, the hours of each day, the minutes of each hour, Easter-day, and all other feasts, and the Dominical Letter. The third part has the geographical description of all Germany, and particularly of Strasburg,

with the names of the inventor, and of all the workmen. In the middle frame of the clock is an astrolabe, shewing the sign in which each planet is every day, and there are the statues of the seven planets, upon a round piece of iron, lying flat; so that every day the statue of the planet that rules the day comes forth, the rest being hid within the frames, till they come out by course at their day, as the sun upon Sunday, and so for all the week. And there is also a terrestrial globe, which shews the quarter, the half hour, and the minutes. There is also the skull of a dead man, and statues of two boys, one of whom turns the hour-glass when the clock has struck, the other puts forth the rod in his hand at each stroke of the clock. Moreover, there are the statues of the Spring, Summer, Autumn, and Winter, and many observations of the moon.

In the upper part of the clock are four old men's statues, which strike the quarters of the hour; the statue of Death comes out at each quarter to strike, but is driven back by the statue of Christ, with a spear in his hand, for three-quarters; but in the fourth quarter, that of Christ goes back, and that of Death strikes the hour, with a bone in his hand, and then the chimes sound. On the top of the clock is an image of a cock, which twice in the day cries aloud, and claps his wings. Besides, this clock is decked with many rare pictures: and being on the inside of the church, carries another frame to the outside of the wall, wherein the hours of the sun, the courses of the moon, the length of the day, and such other things, are set out with great art.

CLEPSYDRA—is a water-clock, or instrument to measure time by the fall of a certain quantity of water, and is constructed on the following principles.—Suppose a cylindrical vessel, whose charge of water flows out in twelve hours, were required to be divided into parts, to be discharged each hour. 1. As the part of time is to the whole time, Twelve, so is the same time Twelve to a fourth proportional Hundred-and-forty-four. Divide the altitude of the vessel into one hundred and forty-four equal parts: here the last will fall to the last hour; the three next above, to the last part but one; the five next, to the tenth hour; lastly, the twenty-three last to the first hour. For since the times increase in the series of the natural numbers 1, 2, 3, 4, 5, &c. and the altitudes, if the numeration be in a retrograde order from the twelfth hour, increase in the series of the unequal numbers 1, 3, 5, 7, 9, &c. the altitudes computed from the twelfth hour will be as the squares of the times 1, 4, 9, 16, 25, &c. Therefore the squares of the whole time, one hundred and forty-four, comprehend all the parts of the altitude of the vessel to be emptied. But a third propor-

tional to 1 and 12, is the square of twelve, and consequently it is the number of equal parts in which the altitude is to be distributed, according to the series of the unequal numbers, through the equal interval of hours:

There were many kinds of clepsydræ among the ancients; but they all had this in common, that the water ran generally through a narrow passage, from one vessel to another, and in the lower was a piece of cork, or light wood, which, as the vessel filled, rose up by degrees, and shewed the hour.

We shall in the next place make a few remarks on the INVENTION OF WATCHES.—The invention of spring or pocket watches belongs to the 17th century. It is true, we find mention made of a watch presented to Charles V. in the history of that prince: but this, in all probability, was no more than a kind of clock to be set on a table, some resemblance whereof we have still remaining in the ancient pieces made before the year 1670. There was also a story of a watch having been discovered in Scotland, belonging to King Robert Bruce; but this we believe has turned out altogether erroneous. The glory of this very useful invention lies between Dr. Hooke and M. Huygens; but to which of them it properly belongs, has been greatly disputed; the English ascribing it to the former, and the French, Dutch, &c. to the latter. Mr. Derham, in his *Artificial Clockmaker*, says, roundly, that Dr. Hooke was the inventor; and adds, that he contrived various ways of regulation. One way was, with a loadstone; another with a tender straight spring, one end whereof played backwards and forwards with the balance, so that the balance was to the spring as the bob to a pendulum, and the spring as the rod thereof. A third method was, with two balances, of which there were divers sorts; some having a spiral spring to the balance for a regulator, and others not. But the way that prevailed, and which still continues to prevail, was, with one balance, and one spring running round the upper part of the verge; though this has a disadvantage, from which those with two springs, &c. were free, since a sudden jerk, or confused shake, will alter its vibrations, and disturb its motion.

The time of these inventions was about the year 1658; as appears, among other evidences, from an inscription on one of the double-balance watches presented to King Charles II. viz. “Rob. Hooke *inven.* 1658. T. Tompion *fecit.* 1675.” The invention presently got into reputation, both at home and abroad: and two of them were sent for by the dauphin of France. Soon after this, M. Huygens’ watch with a spiral spring got abroad, and made a great noise in England, as if the longitude could be found by it. It is certain, however, that his invention was later than the year 1673, when his

book "*De Horol. Oscillat.*" was published; wherein he has not one word of this, though he has of several other contrivances in the same way.

One of these the Lord Brouncker sent for out of France, where M. Huygens had got a patent for them. This watch agreed with Dr. Hooke's, in the application of the spring to the balance; only M. Huygens' had a long spiral spring, and the pulses and beats were much slower. The balance, instead of turning quite round, as Dr Hooke's, turns several rounds every vibration.

Mr. Derham suggests, that he has reason to think M. Huygens' fancy was first set to work by some intelligence he might have of Dr. Hooke's invention from Mr. Oldensworth, or some other of his correspondents in England; and this, notwithstanding Mr. Oldensworth's attempt to vindicate himself in the Philosophical Transactions, appears to be the truth. Huygens invented divers other kinds of watches, some of them without any string or chain at all; which he called particularly, pendulum watches.



CHAP. LXXIII.

CURIOSITIES RESPECTING THE ARTS.—(*Continued.*)

Telegraph—Spectacle of a Sea Fight at Rome—Wooden Eagle; and Iron Fly—Whitehead's Ship—Scalio's Lock, &c.—Praxiteles' Venus—Weaving Engine—Hydraulic Birds—Herschell's Grand Telescope—Boverick's Curiosities—Bunzlau Curiosities—Artificial Flying.

TELEGRAPH.—This is a word derived from the Greek, and which is very properly given to an instrument, by means of which information may be almost instantaneously conveyed to a considerable distance. The telegraph, though it has been generally known and used by the moderns only for a few years, is by no means a modern invention. There is reason to believe, that amongst the Greeks there was some sort of telegraph in use. The burning of Troy was certainly known in Greece very soon after it happened, and before any person had returned from thence. Now that was altogether so tedious a piece of business, that conjecture never could have supplied the place of information. A Greek play begins with a scene, in which a watchman descends from the top of a tower in Greece, and gives the information that Troy was taken. "I have been looking out these ten years (says he) to see

when that would happen, and this night it is done." Of the antiquity of a mode of conveying intelligence quickly to a great distance, this is certainly a proof. The Chinese, when they send couriers on the great canal, or when any great man travels there, make signals by fire, from one day's journey to another, to have every thing prepared; and most of the barbarous nations used formerly to give the alarm of war by fires lighted on the hills, or rising grounds.

It does not appear that the moderns had thought of such a machine as a telegraph, till the year 1663, when the Marquis of Worcester, in his "Century of Inventions," affirmed, that he had discovered "a method by which, at a window, as far as eye can discover black from white, a man may hold discourse with his correspondent, without noise made, or notice taken, being, according to occasion given, or means afforded, *ex re nata*, and no need of provision beforehand; though much better if foreseen, and course taken by mutual consent of parties." This could be done only by means of a telegraph, which, in the next sentence, is declared to have been rendered so perfect, that by means of it the correspondence could be carried on "by night as well as by day, though as dark as pitch is black."

About forty years afterwards, M. Amontons proposed a new telegraph. His method was this:—Let there be people placed in several stations, at such a distance from one another, that, by the help of a telescope, a man in one station may see a signal made in the next before him; he must immediately make the same signal, that it may be seen by persons in the station next after him, who are to communicate it to those in the following station, and so on. These signals may be as letters of the alphabet, or as a cipher, understood only by the two persons who are in the distant places, and not by those who make the signals. The person in the second station making the signal to the person in the third, the very moment he sees it in the first; the news may be carried to the greatest distance in as little time as is necessary to make the signals in the first station. The distance of the several stations, which must be as few as possible, is measured by the reach of a telescope. Amontons tried this method in a small tract of land, before several persons of the highest rank at the court of France. It was not, however, till the French revolution, that the telegraph was applied to useful purposes.

Whether M. Chappe, who is said to have invented the telegraph first used by the French about the end of 1793, knew any thing of Amontons's invention or not, it is impossible to say; but his telegraph was constructed on principles nearly similar. The manner of using this telegraph was as follows:—At the first station, which was on the roof of the palace of Louvre, at

Paris, M. Chappe, the inventor, received in writing from the Committee of Public Welfare, the words to be sent to Lisle, near which the French army at that time was. An upright post was erected on the Louvre, at the top of which were two transverse arms, moveable in all directions by a single piece of mechanism, and with inconceivable rapidity. He invented a number of positions for these arms, which stood as signs for the letters of the alphabet; and these, for the greater celerity and simplicity, he reduced in number as much as possible. The grammarian will easily conceive that sixteen signs may amply supply all the letters of the alphabet, since some letters may be omitted, not only without detriment, but with advantage. These signs, as they were arbitrary, could be changed every week; so that the sign of B for one day, might be the sign of M the next; and it was only necessary that the persons at the extremities should know the key. The intermediate operators were only instructed generally in these sixteen signals; which were so distinct, so marked, so different the one from the other, that they were remembered with the greatest ease.

The construction of the machine was such, that each signal was uniformly given in precisely the same manner at all times: it did not depend on the operator's manual skill: and the position of the arm could never, for any one signal, be a degree higher or a degree lower, its movement being regulated mechanically. M. Chappe having received, at the Louvre, the sentence to be conveyed, gave a known signal to the second station (which was Mont Martre) to prepare. At each station there was a watch-tower, where telescopes were fixed, and the person on watch gave the signal of preparation which he had received, and this communicated successively through all the line, which brought them all into a state of readiness. The person at Mont Martre then received, letter by letter, the sentence from the Louvre, which he repeated with his own machine; and this was again repeated from the next height, with inconceivable rapidity, to the final station at Lisle.

Various experiments were in consequence tried upon telegraphs in this country; and one was soon after set up by government, in a chain of stations from the admiralty-office to the sea-coast. It consists of six octagon boards, each of which is poised upon an axis in a frame, in such a manner that it can be either placed vertically, so as to appear with its full size to the observer at the nearest station, or it becomes invisible to him by being placed horizontally, or with only the narrow edge exposed. These six boards make thirty-six changes, by the most plain and simple mode of working; and they will make many more, if more were necessary.

We submit to the reader the following account of a **SPECTACLE OF A SEA FIGHT AT ROME**.—Augustus, to divert his mind from fixing on his domestic misfortunes, exhibited the most magnificent and expensive shows that had ever been seen at Rome. Chariot-races in the circus, representations on the stage, combats by gladiators, &c. were now become common. Augustus, therefore, the better to divert both himself and the people, revived these sports, which had been for a considerable time laid aside, on account of the extraordinary charges that attended them. He caused a canal to be dug, eighteen hundred paces in length, and two hundred in breadth, conveying into it the Flaminian waters, and building scaffolds quite round it, capable of holding a prodigious multitude of spectators. And indeed the concourse of people was so great, that the emperor was obliged to place guards in all quarters of the city, lest the thieves should lay hold of that opportunity to plunder the empty and abandoned houses. Augustus had frequently entertained the people with fights of lions, tigers, elephants, rhinoceroses, &c. but now the new canal appeared all on a sudden covered with crocodiles, of which thirty-six were killed by Egyptians, brought from the banks of the Nile for that purpose. The multitude were highly delighted by this sight, which was quite new; but the sea-fight which ensued, afforded them still greater diversion: for, at the opposite ends of the lake, or canal, two fleets appeared, the galleys of one being built after the Greek, and those of the other after the Persian manner. Both fleets engaged; and, as they fought in good earnest, most of the combatants being persons sentenced to death, the battle proved very bloody.

A WOODEN EAGLE, AND AN IRON FLY.—Petrus Ramus tells us of a Wooden Eagle and an Iron Fly, made by Regiomontanus, a famous mathematician at Nuremberg: whereof the first flew forth out of the city, aloft in the air, met the Emperor Maximilian a good way off, coming towards it; and, having saluted him, returned again, waiting on him at the city gates. The second, at a feast, whereto the Emperor had invited his familiar friends, flew forth from his hand, and, taking a round, returned thither again, to the great astonishment of the beholders: both which, the excellent pen of the noble Du Bartas has expressed in the following lines:

Why should I not that Wooden Eagle mention,
A learned German's late admir'd invention,
Which, mounting from his fist that fram'd her,
Flew far to meet the German Emperor?
And, having met him, with her nimble train
And pliant wings turning about again,

Follow'd him close unto the castle gate
Of Nuremberg; whom all their shows of state,
Streets hung with arras, arches curious built,
Grey-headed senate, and youth's gallantries,
Grac'd not so much as only this device.

He goes on, and thus describes the Fly:

Once, as this artist, more with mirth than meat;
Feasted some friends whom he esteemed great,
Forth from his hand an Iron Fly flew out;
Which having flown a perfect round about,
With weary wings returned to his master,
And as judicious on his arm he plac'd her.
Oh! wit divine, that in the narrow womb
Of a small Fly could find sufficient room
For all those springs, wheels, counterpoise, and chains,
Which stood instead of life, and blood, and veins.

WHITEHEAD'S SHIP.—George Whitehead, an Englishman, made a ship, with all her tackling, to move itself on a table, with rowers plying the oars, a woman playing on the lute, and a little whelp crying on the deck,—says Scottus, in his Itinerary.

SCALIOT'S LOCK, &c.—In the twentieth year of Queen Elizabeth, Mark Scaliot, a blacksmith, made a lock, consisting of eleven pieces of iron, steel, and brass, all which, together with a pipe-key to it, weighed but one grain of gold: he made also a chain of gold, consisting of forty-three links, whereunto having fastened the lock and key before mentioned, he put the chain about a flea's neck, which drew them all with ease. All these together, lock and key, chain and flea, being weighed, the weight of them was but one grain and a half.

PRAXITELES' VENUS.—Praxiteles, who was an ingenious worker in imagery, made a statue of Venus for the Cnidians, so much resembling life, that a certain young man became enamoured of it to such a degree, that the excess of his love deprived him of his senses. This piece of art was so eagerly coveted by king Nicomedes, that, though the Cnidians owed him an immense sum of money, he offered to take the statue in full satisfaction for his debt; but was refused.

The next subject is a curious **WEAVING ENGINE.**—At Dantzic in Poland, there was set up a rare invention for weaving four or five webs at a time, without any human help. It was an engine that moved of itself, and would work night and day. This invention was suppressed, because it would have ruined the poor people of the town; and the artificer was secretly destroyed, as Lancelotti, the Italian abbot, relates from the mouth of M. Muller, a Pole, who had seen the device.

HYDRAULIC BIRDS.—At Tibur, in Tivoli, near Rome, in the gardens of Hippolitus d'Este, Cardinal of Ferrara, there are the representations of sundry birds sitting on the tops of trees, which, by hydraulic art, and secret conveyances of water through the trunks and branches of the trees, are made to sing and clap their wings; but at the sudden appearance of an owl out of a bush of the same artifice, they immediately become all mute and silent. It was the work of Claudius Gallus, as Possivenus informs us.

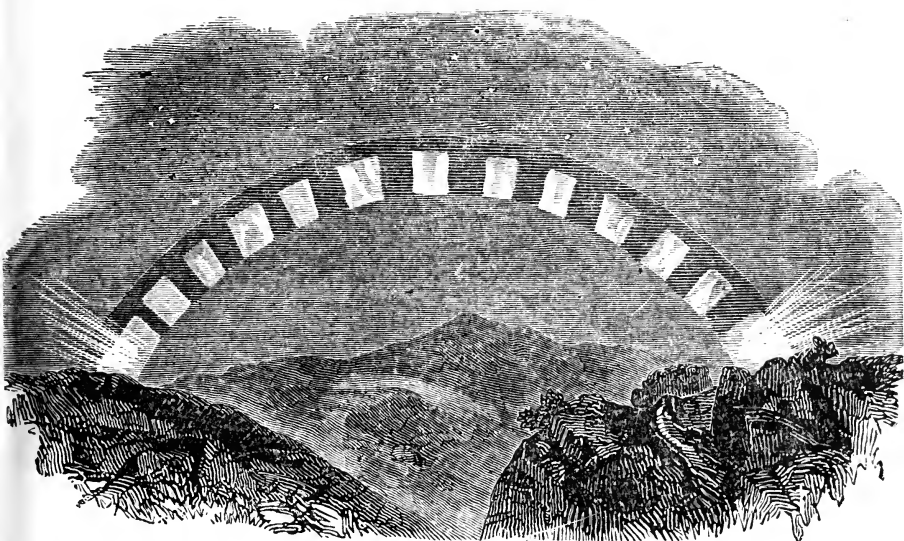
HERSCHELL'S GRAND TELESCOPE.—The tube of this telescope is thirty-nine feet four inches in length, and four feet ten inches in diameter, every part being made of iron. It stands in the open air, appears to be considerably elevated, and is encircled with a complicated scaffolding, by which its steadiness is secured. The concave face of its speculum is *forty-eight inches* of polished surface in diameter, and it weighs nearly *two thousand one hundred and eighteen pounds!* With proper eye-glasses it magnifies above *six thousand times*: it is the largest instrument, and has the greatest magnifying power, of any that has been made. By its aid, Dr. Herschell has been able to observe the lightning in the atmosphere of the moon, and has found out several celestial bodies, unknown to preceding astronomers. The whole was finished on August the 28th, 1789, on which day the *sixth* satellite of Saturn was discovered. The observer, suspended at the end of the instrument, with his back towards the object he views, looks down the tube, and sees the image reflected from the mirror; whilst a man below turns gently round the instrument, to accord with the apparent rotatory motion of the heavens, thus preserving the image of the object on the mirror with stability.

BOVERICK'S CURIOSITIES.—Mr. Baker, in his Treatise on the Microscope, says, "I myself have seen, near Durham Yard, in the Strand, and have examined with my microscope, a chaise, (made by one Mr. Boverick, a watch-maker,) having four wheels, with all the proper apparatus belonging to them, turning readily on their axles, together with a man sitting in the chaise, all formed of ivory, and drawn along by a flea, without any seeming difficulty. I weighed it with the greatest care I was able; and found the chaise, man, and flea, were barely equal to a single grain. I weighed also, at the same time and place, a brass chain made by the same hand, about two inches long; containing two hundred links, with a hook at at one end, and a padlock and key at the other; and found it less than the third part of a grain. I have seen (made by the same artist) a quadrille table with a drawer in it, an eating-

table, a sideboard table, a looking-glass, twelve chairs, with skeleton backs, two dozen of plates, six dishes, a dozen knives, and as many forks, twelve spoons, two salts, a frame and castors, together with a gentleman, lady, and footman, all contained in a cherry-stone, and not filling much more than half of it.

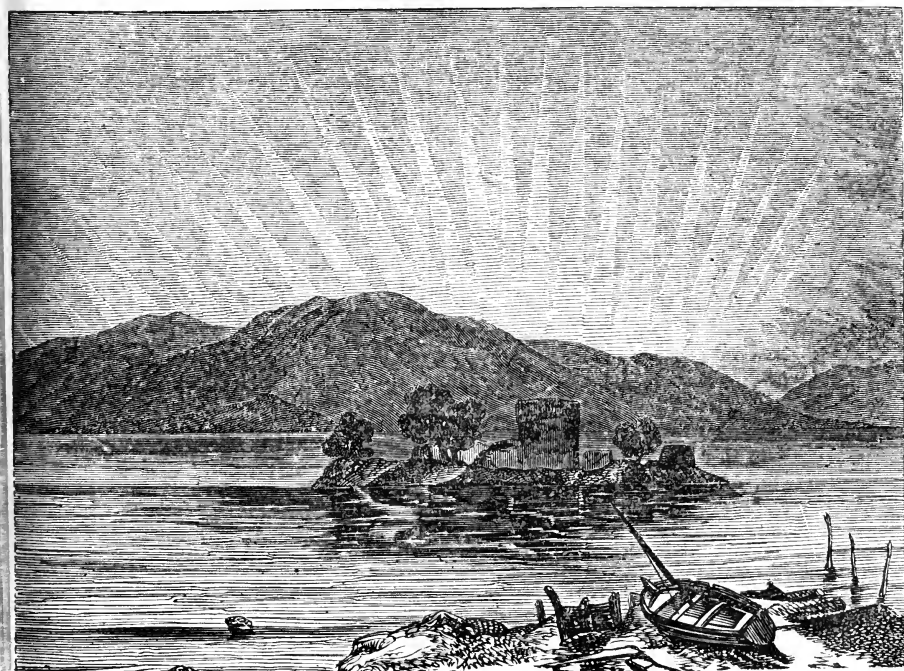
BUNZLAU CURIOSITIES.—Mr. Adams, in his *Letters on Silesia*, gives the following account of two ingenious mechanics he met with at Bunzlau. Their names were Jacob, and Huttig; the one was a carpenter, the other a weaver, and they were next-door neighbours to each other. “The first (says Mr. Adams) has made a machine, in which, by the means of certain clock-work, a number of puppets, about six inches high, are made to move upon a kind of stage, so as to represent in several successive scenes the passion of Jesus Christ. The first exhibits him in the garden at prayer, while the three apostles are sleeping at a distance. In the last, he is shewn dead in the sepulchre, guarded by two Roman soldiers. The intervening scenes represent the treachery of Judas, the examination of Jesus before Caiaphas, the dialogue between Pilate and the Jews concerning him, the denial of Peter, the scourging, and the crucifixion. It is all accompanied by a mournful dirge of music; and the maker, by way of explanation, repeats the passages of Scripture which relate the events he has undertaken to shew. I never saw a stronger proof of the strength of the impression of objects, which are brought immediately home to the senses. I have heard and read more than one eloquent sermon upon the passion; but I confess, none of their most laboured efforts at the pathetic ever touched my heart with one-half the force of this puppet-show. The traitor’s kiss, the blow struck by the high-priest’s servant, the scourging, the nailing to the cross, the sponge of vinegar, every indignity offered, and every pain inflicted, occasioned a sensation, when thus made perceptible to the eye, which I had never felt at mere description.

“Huttig, the weaver, with an equal, or superior mechanical genius, has applied it in a different manner, and devoted it to geographical, astronomical, and historical pursuits. In the intervals of his leisure from the common weaver’s work, which affords him subsistence, he has become a very learned man. The walls of his rooms are covered with maps and drawings of his own, representing, here the course of the Oder, with all the towns and villages through which it runs; there, the mountains of Switzerland, and those of Silesia, over both of which he has travelled in person. In one room he has two very large tables, one raised above the other: on one of them he has ranged all the towns and remarkable places of Germany;



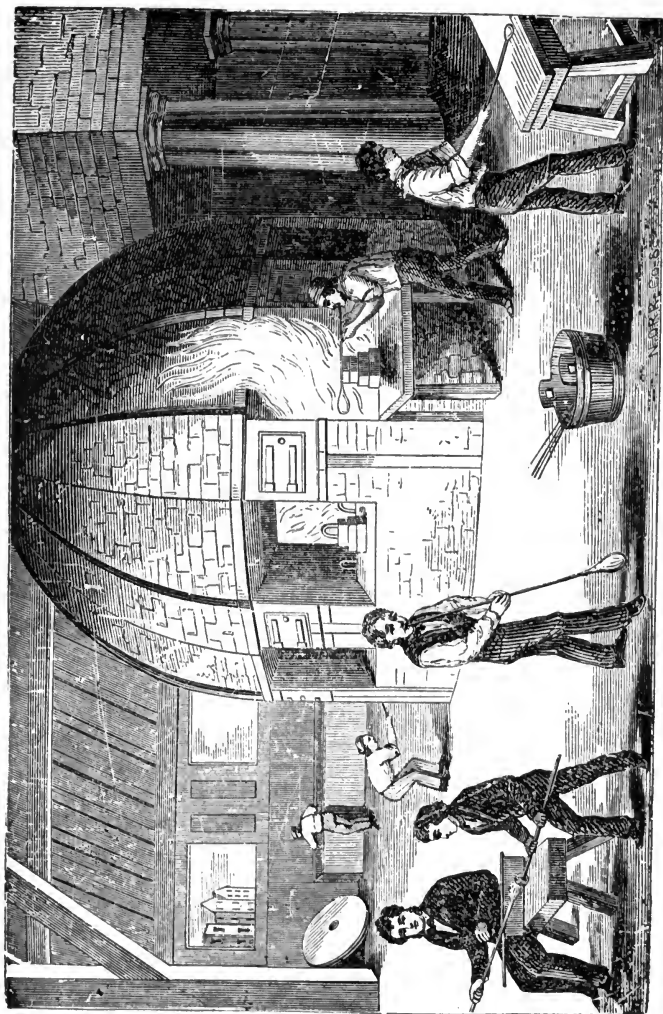
AURORA BOREALIS.

This is an extraordinary appearance of the Aurora Borealis, observed by Captain Parry in his expedition to the Arctic regions.



AURORA BOREALIS.

This is an aspect of the Aurora Borealis sometimes observed in Scotland. The view embraces a portion of Loch Leven, with the island and the castle in which the unfortunate Mary Queen of Scots was imprisoned.



GLASS BLOWING.

and on the other, of all Europe: they are placed according to their respective geographical bearings. The names of the towns are written on a small square piece of paper, and fixed in a slit on the top of a peg, which is stuck into the table. The remarkable mountains are shewn by some pyramidal black stones; and little white pyramids are stationed at all the spots which have been distinguished by any great battle, or other remarkable incident. The man himself, in explaining his work, shews abundance of learning, relative to the ancient names of places, and the former inhabitants of the countries to which he points; and amused us with anecdotes of various kinds, connected with the lands he has marked out.

Thus, in shewing us the Alps, he pointed to the very spot over which the French army of reserve so lately passed, and where Buonaparte so fortunately escaped being taken by an Austrian officer; and then he gave us a short comment of his own, upon the character and extraordinary good fortune of the First Consul. In a second room he has a large machine, representing the Copernican system of the universe: it is made in such a manner, that the whole firmament of fixed stars moves round our solar system once in every twenty-four hours, and thus always exhibits the stars, in the exact position, relative to our earth, in which they really stand. Internally, he has stationed all the planets which belong to our system, with their several satellites, and all the comets that have been observed during the last three centuries. In a third room he has another machine, exhibiting in different parts the various phases of the moon, and those of Jupiter's satellites, the apparent motion of the sun round the earth, and the real motion of the earth round the sun.

"In his garret he has another work, upon which he is yet occupied, and which, being his last labour, seems to be that in which he takes the most delight. Upon a very large table, similar to that in the first room, he has inlaid a number of thin plates of wood, formed so as to represent a projection of the earth under Mercator's plan. All the intervals between the plates of wood designate that portion of the world which is covered with water. He has used a number of very small ropes of two colours, drawn over the surface in such a manner as to describe the tracks of all the celebrated circumnavigators of the globe. The colours of the ropes distinguish the several voyages which claim especial pre-eminence above the rest. To Columbus, Anson, and Cook, he has shewn a special honour by three little models of ships bearing their names, which are placed upon the surface of his ocean, in some spot of their respective courses. The names of all the other voyagers, and the times at which their voyages were performed, are marked by papers fixed at the points of their departure. Such

is the imperfect description I can give you, from a short view of the labours of this really curious man. He must be nearly, or quite seventy years old, and has all his lifetime been of an infirm constitution. But this taste for the sciences, he told us, was hereditary in his family, and had been common to them all, from his great-grandfather down to himself. His dress and appearance were those of a common weaver: but his expressive countenance, at once full of enthusiastic fire and of amiable good-nature, was a model, upon which Lavater might expatiate with exultation. The honest and ingenious weaver, on our taking leave, made us smile by exclaiming, that now, if he could but have a traveller from Africa come to see his works, he could boast of having had visitors from all the four quarters of the globe."

ARTIFICIAL FLYING.—The art of flying has been attempted by several persons in all ages. The Leucadians, out of superstition, are reported to have had a custom of precipitating a man from a high cliff into the sea, first fixing feathers, variously expanded, round his body, in order to break his fall. Friar Bacon, who lived near five hundred years ago, not only affirms the art of flying possible, but assures us, that he himself knew how to make an engine, wherein a man, sitting, might be able to convey himself through the air, like a bird; and further adds, that there was one who had then tried it with success: but this method, which consisted of a couple of large thin hollow copper globes, exhausted of the air, and sustaining a person who sat thereon, Dr. Hooke shews to be impracticable. The philosophers of King Charles the Second's reign were mightily busied about this art. Bishop Wilkins was so confident of success in it, that he says, he does not question but, in future ages, it will be as usual to hear a man call for his wings, when he is going a journey, as it is now to call for his boots.

The art of flying has in some measure been brought to bear in the construction and use of balloons.

CHAP. LXXIV.

CURIOSITIES RESPECTING THE ARTS.—(*Concluded*)

Burning Glasses—Ductility of Glass—Remarkable Ductility and Extensibility of Gold—Pin Making—Needles—Shoes—The Great Bell of Moscow.

BURNING GLASSES.—We have some extraordinary instances and surprising accounts of prodigious effects of burning-glasses. Those made of reflecting mirrors are more powerful than those made with lenses, because the rays from a mirror are reflected all to one point nearly; whereas by a lens, they are refracted to different points, and are therefore not so dense or ardent. The whiter also the metal or substance is, of which the mirror is made, the stronger will be the effect.

The most remarkable burning-glasses, or rather mirrors, among the ancients, were those of Archimedes and Proclus; by the first of which the Roman ships, besieging Syracuse, (according to the testimony of several writers,) and by the other, the navy of Vitalian besieging Byzantium, were reduced to ashes. Among the moderns, the burning mirrors of greatest eminence, are those of Vilette, and Tschirnhausen, and the new complex one of M. de Buffon.

That of M. de Vilette was three feet eleven inches in diameter, and its focal distance was three feet two inches. Its substance is a composition of tin, copper, and tin glass. Some of its effects, as found by Dr. Harris and Dr. Desaguliers, are, that a silver sixpence melted in seven seconds and a half; a king George's halfpenny melted in sixteen seconds, and ran in thirty-four seconds; tin melted in three seconds; and a diamond weighing four grains, lost seven-eighths of its weight. That of M. de Buffon is a polyhedron, six feet broad, and as many high, consisting of one hundred and sixty-eight small mirrors, or flat pieces of looking-glass, each six inches square; by means of which, with the faint rays of the sun in the month of March, he set on fire boards of beech-wood at one hundred and fifty feet distance. Besides, his machine has the conveniency of burning downwards, or horizontally, at pleasure; each speculum being moveable, so as, by the means of three screws, to be set to a proper inclination for directing the rays towards any given point; and it turns either in its greater focus, or in any nearer interval, which our common burning-glasses can not do, their focus being fixed and determined. M. de Buffon, at another time, burnt

wood at the distance of two hundred feet. He also melted tin and lead at the distance of above one hundred and twenty feet, and silver at fifty.

Mr. Parker, of Fleet-street, London, was induced, at an expense of upwards of £700, to contrive, and at length to complete, a large transparent lens, that would serve the purpose of fusing and vitrifying such substances as resist the fires of ordinary furnaces, and more especially of applying heat in vacuo, and in other circumstances in which it cannot be applied by any other means. After directing his attention for several years to this object, and performing a great variety of experiments in the prosecution of it, he at last succeeded in the construction of a lens, of flint-glass, three feet in diameter, which, when fixed in its frame, exposes a surface two feet eight inches and a half in the clear, without any other material imperfection, except a disfigurement of one of the edges by a piece of the scoria of the mould, which unfortunately found its way into its substance. This lens was double-convex, both sides of which were a portion of a sphere of eighteen feet radius. It is difficult to form an accurate estimate of the burning power of this lens; inasmuch as it is next to impossible to discover what should be deducted for the loss of power, in consequence of the impediments that the glass of which it was made must occasion, as well as the four reflections, and two more by way of diminution; but we will endeavour to appreciate it, after a full allowance for these deductions, which must necessarily result from every means of concentrating the solar rays, and must be considered as the friction of an engine, of which nature they really partake.

The solar rays received on a circular surface of two feet eight inches and a half, when concentrated within the diameter of an inch, will be 105,626 times its intensity, or this number of times greater than the heat of the sun as it is experienced on the surface of the earth. We will suppose, that as the heat of the air, in ordinary summer weather, is 65 degrees, and in sultry weather is 75 degrees, the average of which is 70 degrees, and that we take this as the average effect, the accumulated power of the lens, on the supposition of an uniform heat over the whole surface of the focus, will be equal to 73,938 degrees. It must be recollected, by those who have an opportunity of examining the effects of this lens, that the external part of the focal light was less intense than that part which was near the centre of it; or rather, that the effect was very much accumulated in the centre; but as it is possible that the refraction of the light and of the caloric fluid may not take place in the same angles, we think it safest to consider it as of uniform effect, and after deducting one fourth part thereof as a compensation, there

remains 5545 as the expression of its power. As the application of the second lens reduced the diameter of the focus to half an inch, the effect, without allowing for the reduction of its power, would be equal to 221,816 degrees; but deducting one-fourth for the second transmission, there remains 166,362 degrees, as the expression of its power.

Mr. Parker further informs us, that a diamond, weighing ten grains, exposed to this lens for thirty minutes, was reduced to six grains; during which operation it opened and foliated like the leaves of a flower, which emitted whitish fumes, and when closed again, bore a polish, and retained its form. Gold remained in its metallic state without apparent diminution, notwithstanding an exposure at intervals of many hours: but what is remarkable, the rest, or cupel, which was composed of bone-ash, was tintured with a beautiful pink colour.

The experiments on platina evince that the specimens were in different states of approach to a complete metallic form; several of them threw off their parts in sparks, which in most instances were metallic. Copper, after three minutes' exposure, was not found to have lost in weight.

What is remarkable with regard to experiments on iron, is, that the lower part, i. e. that part in contact with the charcoal, was first melted, when that part which was exposed to the focus remained unfused; an evidence of the effect of flux on this metal.

Several of the semi-crystalline substances, exposed to the focal heat, exhibited symptoms of fusion; such as the agate, oriental flint, cornelian, and jasper: but as the probability is, that these substances were not capable of complete vitrification, it is enough that they were rendered externally of a glassy form. Garnet completely fused on black lead in 120 seconds, lost a quarter of a grain, became darker in colour, and was attracted by the magnet. Ten cut garnets taken from a bracelet began to run the one into the other in a few seconds, and at last formed into one globular garnet. The clay used by Mr. Wedgwood to make his pyrometric test, run in a few seconds into a white enamel. Seven other kinds of clay, sent by Mr. Wedgwood, were all vitrified. Several experiments were made on limestone, some of which were vitrified, but all of which were agglutinated; it is, however, suspected that some extraneous substance must have been intermixed. A globule produced from one of the specimens, on being put into the mouth, flew into a thousand pieces, occasioned, it is presumed, by the moisture.

A subscription was proposed for raising the sum of seven hundred guineas, towards indemnifying the charges of the inventor, and retaining the very curious and useful machine above described in our own country; but from the failure of

the subscription, and some other concurring circumstances, Mr. Parker was induced to dispose of it to Capt. Mackintosh, who accompanied Lord Macartney in the embassy to China: and it was left, much to the regret of philosophers in Europe, at Pekin; where it remains in the hands of persons, who most probably know neither its value nor use.

DUCTILITY OF GLASS.—We all know, that when glass is well penetrated with the heat of the fire, the workmen can figure and manage it like soft wax; but, what is most remarkable, it may be drawn, or spun out, into threads exceedingly long and fine. Our ordinary spinners do not form their threads of silk, flax, or the like, with half the ease and expedition the glass-spinners do threads of this brittle matter. We have some of them used in plumes for children's heads, and divers other works, much finer than any hair, and which bend and wave, like hair, with every wind. Nothing is more simple and easy than the method of making them. There are two workmen employed: the first holds one end of a piece of glass over the flame of a lamp; and when the heat has softened it, a second operator applies a glass hook to the metal thus in fusion, and, withdrawing the hook again, it brings with it a thread of glass, which still adheres to the mass; then, fitting his hook on the circumference of a wheel about two feet and a half in diameter, he turns the wheel as fast as he pleases, which, drawing out the thread, winds it on its run, till, after a certain number of revolutions, it is covered with a skein of glass-thread. The mass in fusion over the lamp diminishes insensibly, being wound out like a clue of silk upon the wheel; and the parts cooling as they recede from the flame, become more coherent to those next to them, and this by many degrees: the parts nearest the fire are always the least coherent, and, of consequence, must give way to the effort the rest make to draw them towards the wheel. The circumference of these threads is usually a flat oval, being three or four times as broad as thick: some of them seem scarcely bigger than the thread of a silkworm, and are surprisingly flexible. If the two ends of such threads are knotted together, they may be drawn and bent, till the aperture, or space in the middle of the knot, does not exceed one-fourth of a line, or one forty-eighth of an inch in diameter. Hence M. Reaumur maintains, that the flexibility of glass increases in proportion to the fineness of the threads; and that, probably, had we but the art of drawing threads as fine as a spider's web, we might weave stuffs and cloths of them for wear. Accordingly, he made some experiments this way; and found that he could make threads fine enough, viz. as fine, in his judgment, as spider's thread. but not long enough for the purposes of any manufacture.

REMARKABLE DUCTILITY AND EXTENSIBILITY OF GOLD.

—Gold is the most ductile, as well as the most malleable, of all metals. According to Cronstedt, one grain of it may be stretched out so as to cover 98 Swedish ells, equal to 63.66 English yards of silver wire; but Wallerius asserts, that a grain may be stretched out in such a manner, as to cover 500 ells of wire. At any rate, the extension is prodigious; for, according to the least of the calculations, the millionth part of a grain of gold may be made visible to the naked eye. Nor is its malleability inferior to its ductility. Boyle, quoted by Apligny, in his treatise on Colours, says, that one grain and a half of gold may be beaten into 50 leaves of an inch square, which, if intersected by parallel lines drawn at right angles to each other, and distant only the hundredth part of an inch from each other, will produce twenty-five millions of little squares, each very easily discernible by the naked eye. Mr. Magellan tells us, that its surface may be extended by the hammer 159,092 times. “I am informed, (says he) by an intelligent goldbeater in England, that the finest gold leaf is that made in new skins, and must have an alloy of three grains of copper to the ounce of pure gold, or else it would be too soft to pass over the irregularities of the skins. He affirms, that 80 books, or 2000 leaves of gold, each leaf containing 10.89 square inches, weigh less than 384 grains. Each book, therefore, of 25 leaves, or 272.25 inches, weighs less than 4.8 grains; so that each grain of the metal will produce about 57 square inches of gold leaf.” From further calculation it appears, that the thickness of these leaves is less than the 282,000th part of an inch; and that 16 ounces of gold would be sufficient to gild a silver wire, equal in length to the whole circumference of the globe we inhabit!

PIN-MAKING.—Though pins are apparently simple, their manufacture is not a little curious and complex. When the brass wire, of which the pins are formed, is first received at the manufactory, it is generally too thick for the purpose of being cut into pins. The first operation, therefore, is that of winding it off from one wheel to another with great velocity, and causing it to pass between the two, through a circle in a piece of iron of smaller diameter. The wire being thus reduced to its proper dimensions, is straightened by drawing it between iron pins, fixed in a board in a zigzag manner, but so as to leave a straight line between them: afterwards it is cut into lengths of three or four yards, and then into smaller ones, every length being sufficient to make six pins. Each end of these is ground to a point, which was performed, (where these observations were made,) by boys, who sat each with two small grinding stones before him, turned by a wheel. Taking

up a handful, he applied the ends to the coarsest of the two stones, being careful at the same time to keep each piece moving round between his fingers, so that the points may not become flat: he then gives them a smoother and sharper point by applying them to the other stone, and by that means a lad of twelve or fourteen years of age, is able to point about sixteen thousand pins in an hour. When the wire is thus pointed, a pin is taken off at each end, and this is repeated till it is cut into six pieces. The next operation is, that of forming the heads, or, as they term it, head-spinning, which is done by means of a spinning-wheel, one piece of wire being thus with astonishing rapidity wound round another, and the interior one being drawn out, leaves a hollow tube between the circumvolutions: it is then cut with shears, every two circumvolutions, or turns of the wire, forming one head; these are softened by throwing them into iron pans, and placing them in a furnace till they are red hot. As soon as they are cold, they are distributed to children, who sit with hammers and anvils before them, and catching one at the extremity, they apply them immediately to the anvil and hammer, and by a motion or two of the foot, the top and the head are fixed together in much less time than it can be described, and with a dexterity only to be acquired by practice. The pin is now finished as to its form, but still it is merely brass; it is therefore thrown into a copper containing a solution of tin and the lees of wine. Here it remains for some time, and, when taken out, assumes a white, though dull appearance: in order therefore to give it a polish, it is put into a tub containing a quantity of bran, which is set in motion by turning a shaft that runs through its centre, and thus, by means of friction, it becomes perfectly bright. The pin being complete, nothing remains but to separate it from the bran, which is perfectly similar to the winnowing of corn, the bran flying off, and leaving the pin behind it for immediate sale.

We must not forget to present to the reader some curious particulars respecting the manufacture of NEEDLES.—Needles make a very considerable article in commerce, though there is scarcely any commodity cheaper, the consumption of them being almost incredible. The sizes are from No. 1, the largest, to No. 25, the smallest. In the manufacture of needles, German and Hungarian steel are of most repute.

In the making of them, the first thing is, to pass the steel through a coal fire, and under a hammer, to bring it out of its square figure into a cylindrical one. This done, it is drawn through a large hole of a wire-drawing iron, and returned into the fire, and drawn through a second hole of the iron, smaller than the first; and thus successively from hole to hole, till i

has acquired the degree of fineness required for that species of needles; observing, every time it is to be drawn, that it be greased over with lard, to render it more manageable. The steel, thus reduced to a fine wire, is cut in pieces of the length of the needles intended. These pieces are flatted at one end on the anvil, by force of a puncheon of well-tempered steel, and laid on a leaden block to bring out, with another puncheon, the little piece of steel remaining in the eye. The corners are then filed off the square of the heads, and a little cavity filed on each side of the flat of the head; this done, the point is formed with a file, and the whole filed over: they are then laid to heat red-hot on a long narrow iron, crooked at one end, in a charcoal fire; and when taken out thence, are thrown into a bason of cold water to harden. On this operation a good deal depends; too much heat burns them, and too little leaves them soft; the medium is learned by experience. When they are thus hardened, they are laid in an iron shovel on a fire more or less brisk in proportion to the thickness of the needles; taking care to move them from time to time. This serves to temper them, and take off their brittleness; great care here too must be taken of the degree of heat. They are then straightened one after another with the hammer, the coldness of the water used in hardening them having twisted the greatest part of them.

The next process is the polishing of them. To do this, they take 12,000 or 15,000 needles, and range them in little heaps against each other, on a piece of new buckram sprinkled with emery-dust. The needles being thus disposed, emery-dust is thrown over them, which is again sprinkled with oil of olives; at last the whole is made up into a roll, well bound at both ends. This roll is then laid on a polishing table, and over it a thick plank loaded with stones, which two men work backwards and forwards a day and a half, or two days, successively; by which means the roll thus continually agitated by the weight and motion of the plank over it, the needles withinside being rubbed against each other with oil and emery, are insensibly polished. After polishing, they are taken out, and the filth washed off them with hot water and soap: they are then wiped in hot bran, a little moistened, placed with the needles in a round box suspended in the air by a cord, which is kept stirring till the bran and needles are dry. The needles thus wiped in two or three different brans, are taken out and put in wooden vessels, to have the good separated from those whose points or eyes have been broken either in polishing or wiping; the points are then all turned the same way, and smoothed with an emery-stone turned with a wheel. This operation finishes them, and there remains nothing but to make them into packets.

Needles were first made in England by a native of India, in 1545, but the art was lost at his death; it was, however, recovered by Christopher Greening, in 1560, who was settled, with his three children, Elizabeth, John, and Thomas, by Dr. Damar, ancestor of the present Lord Milton, at Long Crendon, in Bucks, where the manufactory has been carried on from that time to the present day.

CURIOSITIES RESPECTING SHOES.—Among the Jews, shoes were made of leather, linen, rush, or wood; those of soldiers were sometimes of brass or iron. They were tied with thongs, which passed under the soles of the feet. To put off their shoes, was an act of veneration; it was also a sign of mourning and humiliation: to bear one's shoes, or to untie the latches of them, was considered as the meanest service, as appears in the Baptist's declaration of his own inferiority to Christ.

Among the Greeks, shoes of various kinds were used. Sandals were worn by women of distinction. The Lacedemonians wore red shoes. The Grecian shoes generally reached to the middle of the leg. The Romans used two kinds of shoes: the *calceus*, which covered the whole foot, somewhat like our shoes, and was tied above with latches or strings; and the *solea*, or slipper, which covered only the sole of the foot, and was fastened with leathern thongs. The *calceus* was always worn along with the *toga*, when a person went abroad: slippers were put on during a journey, and at feasts, but it was reckoned effeminate to appear in public with them. Black shoes were worn by the citizens of ordinary rank, and white ones by the women. Red shoes were sometimes worn by the ladies, and purple ones by the coxcombs of the other sex. Red shoes were put on by the chief magistrates of Rome, on days of ceremony and triumphs. The shoes of senators, patricians, and their children, had a crescent upon them, which served for a buckle; these were called *calcei lunati*. Slaves wore no shoes; hence they were called *cretori*, from their dusty feet. Phocion also, and Cato Uticensis, went without shoes. The toes of the Roman shoes were turned up in the point; hence they were called *calcei rostrati, repandi, &c.*

In the ninth and tenth centuries, the greatest princes of Europe wore wooden shoes, or the upper part of leather, and the sole of wood. In the reign of William Rufus, a great beau, Robert, surnamed *The Horned*, used shoes with long sharp points, stuffed with tow, and twisted like a ram's horn. It is said, the clergy being highly offended, declaimed against the long-pointed shoes with great vehemence. The points, however, continued to increase, till, in the reign of Richard II. they were of so enormous a length, that they were tied to knees with chains, sometimes of gold, sometimes of silver

The upper parts of these shoes, in Chaucer's time, were cut in imitation of a church window. The long-pointed shoes were called *crackowes*, and continued in fashion for three centuries, in spite of the bulls of popes, the decrees of councils, and the declamations of the clergy. At length the parliament of England interposed, by an act A. D. 1463, prohibiting the use of shoes or boots with pikes exceeding two inches in length, and prohibiting all shoemakers from making shoes or boots with longer pikes, under severe penalties. But even this was not sufficient: it was necessary to denounce the dreadful sentence of excommunication against all who wore shoes or boots with points longer than two inches. The present fashion of shoes was introduced in 1633, but the buckle was not used till 1670.

In Norway, they use shoes of a particular construction, consisting of two pieces, and without heels; in which the upper-leather sits close to the foot, the sole being joined to it by many plates or folds.

The shoes or slippers of the Japanese, as we are informed by Professor Thunberg, are made of rice-straw, woven; but sometimes, for people of distinction, of fine slips of ratan. The shoe consists of a sole, without upper-leather or hind-piece: forwards, it is crossed by a strap, of the thickness of one's finger, which is lined with linen; from the tip of the shoe to the strap, a cylindrical string is carried, which passes between the great and second toe, and keeps the shoe fast on the foot. As these shoes have no hind-piece, they make a noise, when people walk in them, like slippers. When the Japanese travel, their shoes are furnished with three strings made of twisted straw, with which they are tied to the legs and feet, to prevent them from falling. Some people carry one or more pairs of shoes with them on their journeys, in order to put on new when the old ones are worn out. When it rains, or the roads are very dirty, these shoes are soon wetted through; and a great number of worn-out shoes are continually seen lying on the roads, especially near the brooks, where travellers have changed their shoes after washing their feet.

Instead of these, in rainy or dirty weather, they wear high wooden clogs, which underneath are hollowed out in the middle, and at top have a band across, like a stirrup, and a string for the great toe; so that they can walk without soiling their feet. Some of them have their straw shoes fastened to these wooden clogs. The Japanese never enter their houses with their shoes on; but leave them in the entry, or place them on the bench near the door, and thus are always barefooted in their houses, so as not to dirty their neat irats.

GREAT BELL OF MOSCOW. From Dr. Clarke's Travels.—
“The great bell of Moscow, known to be the largest ever founded, is in a deep pit in the midst of the Kremlin. The history of its fall is a fable; and as writers are accustomed to copy each other, the story continues to be propagated. The fact is, the bell remains in the place where it was originally cast. It never was suspended; the Russians might as well attempt to suspend a first-rate line-of-battle ship, with all her guns and stores. A fire took place in the Kremlin; the flames caught the building erected over the pit where the bell yet remains; in consequence of this, the bell became hot, and water being thrown to extinguish the fire, fell upon the bell, causing the fracture which has taken place. The bell reaches from the bottom of the cave to the roof. The entrance is by a trap-door, placed even with the surface of the earth. We found the steps very dangerous; some were wanting, and others broken. In consequence of this, I had a severe fall down the whole extent of the first flight, and a narrow escape for my life, in not having my skull fractured upon the bell. After this accident, a sentinel was placed at the trap-door, to prevent people becoming victims to their curiosity. He might have been as well employed in mending the ladders, as in waiting all day to say they were broken. The bell is truly a mountain of metal. It is said to contain a very large proportion of gold and silver. While it was in fusion, the nobles and the people cast in, as votive offerings, their plate and money: I endeavoured in vain to assay a small part: the natives regard it with superstitious veneration, and they would not allow even a grain to be filed off. At the same time, it may be said, the compound has a white shining appearance, unlike bell-metal in general; and, perhaps, its silvery aspect has strengthened, if not excited, a conjecture respecting the costliness of its constituents.

“On festival days, peasants visit the bell as they would resort to a church; considering it an act of devotion, and crossing themselves as they descend and ascend the steps. The bottom of the pit is covered with water, mud, and large pieces of timber; these, added to the darkness, render it always an unpleasant and unwholesome place; in addition to the danger arising from the ladders leading to the bottom. I went frequently there, in order to ascertain the dimensions of the bell with exactness. To my great surprise, during one of those visits, half a dozen Russian officers, whom I found in the pit, agreed to assist me in the admeasurement. It so nearly agreed with the account published by Jonas Hanway, that the difference is not worth notice. This is somewhat remarkable, considering the difficulty of exactly measuring what is partly buried in the earth, and the circumference of

which is not entire. No one, I believe, has yet ascertained the size of the base; this would afford still greater dimensions than those we obtained; but it is entirely buried. About ten persons were present when I measured the part exposed to observation. We applied a strong cord close to the metal, in all parts of its periphery, and round the lower part, where it touches the ground, taking care at the same time not to stretch the cord. From the piece of the bell broken off, it was ascertained that we had thus measured within two feet of its lower extremity. The circumference obtained was sixty-seven feet four inches; allowing a diameter of twenty-two feet five inches, and one-third. We then took the perpendicular height from the top, and found it to correspond exactly with the statement made by Hanway; namely, twenty-one feet four inches and a half. In the stoutest part, that in which it should have received the blow of the hammer, its thickness equalled twenty-three inches. We were able to ascertain this, by placing our hands under water, where the fracture has taken place; this is above seven feet high from the lip of the bell. The weight of this enormous mass of metal has been computed to be 443,772 cwt. which, if valued at three shillings a pound, amounts to £66,565 16s. lying unemployed, and of no use to any one.

It was founded, according to Augustine, in 1653, during the reign of Alexis. (See *Voyage de Moscou*, page 117.) The Russians and people of Moscow maintain, that it was cast during the reign of their empress Anne, probably from the female figure represented. Augustine proves that it is larger than the famous bell of Erford, and even than that of Pekin.

CHAP. LXXV.

CURIOSITIES IN HISTORY, &c.

MAN WITH THE IRON MASK.—There was a remarkable personage, so denominated, who existed as a state prisoner in France during the latter part of the seventeenth century. The circumstances of this person form an historical enigma, which has occasioned much inquiry, and many conjectures. The authenticated particulars concerning the Iron Mask are as follows:—A few months after the death of Cardinal Mazarin, there arrived at the isle of Saint Marguerite, in the sea of Provence, a young prisoner whose appearance was peculiarly attracting: his person was above the middle size, and elegantly formed; his mien and deportment were noble, and

his manners graceful; and even the sound of his voice had in it something uncommonly interesting. On the road he constantly wore a mask made with iron springs, to enable him to eat without taking it off. It was at first believed that this mask was made entirely of iron, whence he acquired the title of *The Man with the Iron Mask*. His attendants had received orders to dispatch him, if he attempted to take off his mask or discover himself. He had been first confined at Pignerol, under the care of the governor, M. de St. Mars; and being sent thence to St. Marguerite, he was accompanied thither by the same person, who continued to have the charge of him. He was always treated with the utmost respect: he was served constantly in plate; and the governor himself placed his dishes on the table, retiring immediately after, and locking the door behind him. He *tu-to' yoit* (*thee'd and thou'd*) the governor; who, on the other hand, behaved to him in the most respectful manner, and never wore his hat before him, nor ever sat down in his presence without being desired. The Marquis of Louvois, who went to see him at St. Marguerite, spoke to him standing, and with those marks of attention which denote high respect.

During his residence there, he attempted twice, in an indirect manner, to make himself known. One day he wrote something with his knife on a plate, and threw it out of his window, to a boat that was drawn on shore near the foot of the tower. A fisherman picked it up, and carried it to the governor. M. de St. Mars was alarmed at the sight; and asked the man with great anxiety, whether he could read, and whether any one else had seen the plate? The man answered, that he could not read, that he had but just found the plate, and that no one else had seen it. He was, however, confined till the governor was well assured of the truth of his assertions. Another attempt to discover himself proved equally unsuccessful. A young man who lived in the isle, one day perceived something floating under the prisoner's window; and on picking it up, he discovered it to be a very fine shirt written all over. He carried it immediately to the governor; who, having looked at some parts of the writing, asked the lad, with some appearance of alarm, if he had not had the curiosity to read it? He protested repeatedly that he had not; but two days afterwards he was found dead in his bed. The *Masque de Fer* remained in that isle till 1698, when M. St. Mars, being promoted to the government of the Bastille, conducted his prisoner to that fortress. In his way thither, he stopt with him at his estate near Palteau. The Mask arrived there in a litter, surrounded by a numerous guard on horseback. M. de St. Mars ate at the same table with him all the time they resided at Palteau; but the latter

was always placed with his back towards the windows; and the peasants, who came to pay their compliments to their master, whom curiosity kept constantly on the watch, observed that M. de St. Mars always sat opposite to him, with two pistols by the side of his plate. They were waited on by one servant only, who brought in and carried out the dishes, always carefully shutting the door, both in going out and returning. The prisoner was always masked, even when he passed through the court; but the people saw his teeth and lips, and observed that his hair was grey. The governor slept in the same room with him, in a second bed, that was placed in it on that occasion. In the course of his journey, the Mask was one day heard to ask his keeper, whether the king had any design on his life? "No, Prince," he replied; "provided that you quietly allow yourself to be conducted, your life is perfectly secure."

The stranger was accommodated as well as it was possible to be in the Bastile. An apartment had been prepared for him by order of the governor before his arrival, fitted up in the most convenient style; and every thing he expressed a wish for, was instantly procured him. His table was the best that could be provided, and he was supplied with as rich clothes as he desired; but his chief taste in this last particular was for lace, and for linen remarkably fine. He was allowed the use of such books as he requested, and he spent much of his time in reading. He also amused himself with playing on the guitar. He had the liberty of going to mass; but was then strictly forbid to speak, or uncover his face: orders were even given to the soldiers to fire upon him, if he attempted either; and their pieces were always pointed towards him as he passed through the court. When he had occasion to see a surgeon or a physician, he was obliged, under pain of death, constantly to wear his mask. An old physician of the Bastile, who had often attended him when he was indisposed, said, that he never saw his face, though he had frequently examined his tongue, and different parts of his body; and that he never complained of his confinement, nor let fall any hint, by which it might be guessed who he was. He often passed the night in walking up and down his room. This unfortunate prince died on the 19th of November, 1703, after a short illness; and was interred next day, in the burying-place of the parish of St. Paul. The expense of his funeral amounted only to forty livres. The name given him was *Marchiali*; and even his age, as well as his real name, it seemed of importance to conceal, for in the register made of his funeral, it was mentioned that he was about forty years old, though he had told his apothecary, some time before his death, that he thought he must be sixty. Immediately after his death, his apparel, linen clothes, mat-

tresses, and in short, every thing that had been used by him, were burnt; the walls of his room were scraped, and the floor taken up, evidently from the apprehension that he might have found means of writing something that would have discovered who he was. Nay, such was the fear of his having left a letter, or any mark which might lead to a discovery, that his plate was melted down; the glass was taken out of the window of his room, and pounded to dust; the window-frames and doors burnt; and the ceiling of the room, and the plaster of the inside of the chimney, demolished.

Several writers have affirmed, that the body of this unfortunate personage was buried without a head; and M. de St. Foix informs us, in his *Essais Historiques*, that "a gentleman having bribed the sexton, had the body taken up in the night, but found a stone instead of the head." The natural inference from these extraordinary accounts, is, that the Iron Mask was not only a person of high birth, but that he must have been of great consequence; and that his being concealed was of the utmost importance to the king and ministry.

Among the various conjectures that have been formed, concerning the real name and condition of this remarkable man, none appears to have any probability except the following:—That he was a son of Anne of Austria, queen to Louis XIII. and consequently that he was a brother of Louis XIV; but whether a bastard-brother, a brother-german, or a half-brother, is a question that has given rise to three several opinions, viz. 1. That the queen proved with child at a time when it was evident it could not have been by her husband, who, for some months before, had never been with her in private. The supposed father of this child is said to have been the duke of Buckingham, who came to France, in May, 1625, to conduct the princess Henrietta, wife of Charles I. to England. The private letters and memoirs of those times speak very suspiciously of the Queen and Buckingham: his behaviour at Amiens, whither the queen and queen-mother accompanied the princess in her way to Boulogne, occasioned much whispering; and it appears, that the king, on this occasion, was extremely offended at her, and that it required all the influence and address of the queen-mother to effect a reconciliation. It is said, that this child was privately brought up in the country; that when Mazarin became a favourite, he was entrusted with the care of him; and that Louis XIV. having discovered the secret on the death of the cardinal, thought it necessary to confine him in the manner above related.

The second, and the most probable opinion, is, that he was the twin-brother of Louis XIV. born some hours after him. This opinion first appeared in a short anonymous work, published without date, or name of place, or printer. It is therein

CEBAR LANDING IN GREAT BRITAIN.





CÆSAR CROSSING THE RUBICON.

said, "Louis XIV. was born at St. Germain-en-Laye, on the 5th of September, 1638, about noon; and the illustrious prisoner, known by the appellation of the Iron Mask, was born the same day, while Louis XIII. was at supper. The king and the cardinal, fearing that the pretensions of a twin-brother might one day be employed to renew those civil wars with which France had been so often afflicted, cautiously concealed his birth, and sent him away, to be brought up privately." This opinion was confirmed, in a work, entitled, *Memoires de Marechal Duc de Richelieu*, written by the Abbé Soulavie; in which it is asserted, that "The birth of the prisoner happened in the evening of the 5th September, 1638, in presence of the chancellor, the bishop of Meaux, the author of the MS. a midwife, named Peronéte, and a sieur Honorat." This circumstance greatly disturbed the king's mind; he observed, that the Salic law had made no provision for such a case. By the advice of cardinal Richelieu, it was therefore resolved to conceal his birth, but to preserve his life, in case, by the death of his brother, it should be necessary to avow him. A declaration was drawn up, and signed and sworn to by all present; in which every circumstance was mentioned, and several marks on his body described. This document being sealed by the chancellor with the royal seal, was delivered to the king; and all took an oath never to speak on the subject, not even in private and among themselves. The child was delivered to the care of Madame Peronéte, to be under the direction of cardinal Richelieu, at whose death the charge devolved to cardinal Mazarin. Mazarin appointed the author of the MS. his governor, and entrusted to him the care of his education. But as the prisoner was extremely attached to Madame Peronéte, and she equally so to him, she remained with him till her death. His governor carried him to his house in Burgundy, where he paid the greatest attention to his education.

As the prisoner grew up, he became impatient to discover his birth, and often importuned his governor on that subject. His curiosity had been roused, by observing that messengers from the court frequently arrived at the house; and a box, containing letters from the queen and the cardinal, having one day been inadvertently left out, he opened it, and saw enough to guess at the secret. From that time he became thoughtful and melancholy, which, (says the author,) I could not then account for. He shortly after asked me, to get him a portrait of the late and present king; but I put him off, by saying, that I could not procure any that were good. He then desired me to let him go to Dijon; which I have known since was with an intention of seeing a portrait of the king there, and of going secretly to St. John de Las, where the

court then was, on occasion of the marriage with the Infanta. He was beautiful, and love helped him to accomplish his wishes. He had captivated the affections of a young house-keeper, who procured him a portrait of the king. It might have served for either of the brothers; and the discovery put him into so violent a passion, that he immediately came to me with the portrait in his hand, saying, *Voila mon frere, et voila qui je suis*, shewing me at the same time a letter of the cardinal de Mazarin that he had taken out of the box!" Upon this discovery, his governor immediately sent an express to court, to communicate what had happened, and to desire new instructions; the consequence of which was, that the governor, and the young prince under his care, were arrested and confined. The author of this memoir concludes, "I have suffered with him in our common prison: I am now summoned to appear before my Judge on high; and for the peace of my soul, I cannot but make this declaration, which may point out to him the means of freeing himself from his present ignominious situation, in case the king his brother should die without children. Can an extorted oath compel me to observe secrecy on a thing so incredible, but which ought to be left on record to posterity?"

The third opinion is, that he was a son of the queen by cardinal Mazarin, born about a year after the death of her husband, Louis XIII.; that he was brought up secretly; and that, soon after the death of the cardinal, on the 9th of March, 1661, he was sent to Pignerol. To this account Father Griffet justly objects, "that it was needless to mask a face that was unknown; and therefore this opinion does not merit discussion."—(*Traite de la Verité de l'Histoire*, p. 318.) Indeed, it seems totally unaccountable, that so much care should have been taken to conceal a child of the queen by the cardinal, who, whether they were privately married or not, could never have had the most distant claim to the crown of France. The conjectures advanced by other authors, that he was the duke of Monmouth's, the count of Vermandois', or the duke of Beaufort's, &c. are still more improbable.



CHAP. LXXVI.

CURIOSITIES IN HISTORY, ETC.—(*Continued.*)

GIPSIES.—Mr. Lyons, in his entertaining work of the *Environs of London*, has given the following curious account of the Queen of the Gipsies, and the extraordinary people under her dominion.

From the register of the parish of Bockenham, in Kent; extract: 'Margaret Finch, buried October 24, 1740.'—"This remarkable person lived to the age of one hundred and nine years. She was one of the people called Gipsies; and had from them the title of Queen. After travelling over various parts of the kingdom, during the greater part of a century, she settled at Norwood, whither her age, and the fame of her fortune-telling, attracted numerous visitors. From a habit of sitting on the ground with her chin resting on her knees, the sinews at length became so contracted, that she could not rise from that posture. After her death, they were obliged to enclose her body in a deep square box. Her funeral was attended by two mourning coaches, a sermon was preached on the occasion, and a great concourse of people attended the ceremony. Her portrait adorns the sign-post of a house of entertainment in Norwood, called the Gipsy-House. In an adjoining cottage lives an old woman, grand-daughter of queen Margaret, who inherits her title. She is niece of queen Bridget, who was buried at Dulwich, in 1768. Her rank seems to be merely titular: I do not find that the gypsies pay her any particular deference; or that she differs in any other respect from the rest of her tribe, than that of being a householder." To the above he adds some leading facts concerning this extraordinary race of people, who are scattered over most parts of Europe, Asia, and America.

"The gipsies, (continues he,) in most places on the Continent are called *Cingari*, or *Zingari*: the Spaniards call them *Gitanos*. It is not certain when they first appeared in Europe; but mention is made of them, in Hungary and Germany, so early as the year 1417. Within ten years afterwards, they made their appearance in France, Switzerland, and Italy. The date of their arrival in England is more uncertain: it is most probable, that it was not till nearly a century afterwards. In the year 1530, they are thus spoken of in the penal statutes 'Forasmuch as before this time, divers and many outlandish people, calling themselves Egyptians, using no craft nor feat of merchandise, have come into this realm, and gone from shire to shire, and from place to place, in great companies; and used great subtilty and crafty means to deceive the people; bearing them in hand, that they, by palmistry, could tell men's and women's fortunes; and so, many times, by craft and subtilty, have deceived the people of their money; and also have committed many heinous felonies and robberies, to the great hurt and deceit of the people they have come among, &c.'

"It was afterwards made death to them to continue in the kingdom; and it remains on record, that thirteen were executed for a violation of this law, a few years before the Resto-

ration: nor was this cruel act repealed till about the year 1783.

"The gipsies were expelled from France in 1560, and from Spain in 1591; but it does not appear that they have been entirely extirpated in any country. Their collective numbers, in every quarter of the globe, have been calculated at seven or eight hundred thousand. They are most numerous in Asia, and in the northern parts of Europe. Various have been the opinions relating to their origin. That they came from Egypt has been the most prevalent. This opinion (which has procured them here the name of Gipsies, and in Spain that of Gitanos,) arose, from some of the first who arrived in Europe, pretending that they came from that country; which assertion they made, perhaps, to heighten their reputation for skill in palmistry* and the occult sciences. It is now, I believe, pretty generally agreed, that they came originally from Hindostan; since their language so far coincides with the Hindostanic, that even now, after a lapse of more than three centuries, during which they have been dispersed in various foreign countries, nearly one half of their words are precisely those of Hindostan; and scarcely any variation is to be found in vocabularies procured from the gipsies in Turkey, Hungary, Germany, and those in England.

"Their manners, for the most part, coincide, as well as their language, in every quarter of the world where they are found; being the same idle, wandering race of beings, and seldom professing any ostensible mode of livelihood, except that of fortune-telling. Though they are no great frequenters either of mosques or churches, they generally conform to rites and ceremonies as they find them established.

"Upon the whole, we may certainly agree with Grellman who has written their history, by regarding them as a singular phenomenon in Europe. For the space of between three or four hundred years, they have gone wandering about like pilgrims and strangers, yet neither time nor example has made in them any alteration: they remain ever, and every where, what their fathers were. Africa makes them no blacker, nor does Europe make them whiter."

It is not the least singular feature in the history of this wandering and vagabond race, that they should have so long maintained their credit for foretelling events, when the fallacy of their predictions must have been so often experienced, and their ignorance and want of principle so well known. What reliance can be placed on the oracular decisions of a man, who has not sufficient foresight of his own affairs, to escape the hands of justice for robbing a hen-roost?

* Palmistry is the pretended art of telling the future events of men's lives by the lines in their hands.

The desire of prying into futurity seems to be a natural propensity in the human mind. In the ancient world, the consultation of oracles, soothsayers, and augurs, divining by the flight of birds, the entrails of the victims, or the feeding of chickens, were so many efforts of a weak endeavour to withdraw that veil, which in mercy is appointed to conceal from our view the events that are to befall us.

In modern times, the impudent pretensions of astrologers, conjurers, and fortune-tellers, have deluded the credulous, even of that rank, in which men should set a more rational example. About sixty years ago, a celebrated professor of this dark science lived in London, in a place called Fryingpan Alley; and crowds of carriages were daily seen waiting in the neighbourhood, whilst the artful impostor was distributing different allotments to their owners, according to his arbitrary caprice, or what he thought would bring most money into his purse.

The following account is taken from a Liverpool weekly magazine, entitled 'The Freeman,' published some years since:—

"Of late years some attempts have been made to reduce the numbers, or at any rate to civilize the habits, of that vagabond and useless race, the gipsies. In pursuance of such purpose, a society of gentlemen have been making all the preliminary inquiries requisite to a proper understanding of the subject. A series of questions have been proposed to competent persons in the different counties of England and Scotland; and answers have been received. The following are specimens of these replies:

"1. All gipsies believe that Egypt was the residence of their most remote ancestors.

"2. They cannot form any idea of their number in England.

"3. The gipsies of Bedfordshire, Hertfordshire, some parts of Buckinghamshire, Cambridgeshire, and Huntingdonshire, are continually making revolutions within the ranges of those counties.

"4. They are either ignorant of the number of gipsies in the counties through which they travel, or unwilling to disclose their knowledge.

"5. The most common names are Smith, Cooper, Draper, Taylor, Boswell, Lee, Lovel, Loversedge, Allen, Mansfield, Glover, Williams, Carew, Martin, Stanley, Buckley, Plunkett, and Corrie.

"6. and 7. The gangs in different towns have not any regular connection or organization; but those who take up their winter quarters in the same city or town, appear to have some knowledge of the different routes each horde will pursue;

probably with a desire to prevent interference with each other.

"8. In the county of Herts, it is computed there may be sixty families, having many children. Whether they are quite so numerous in Buckinghamshire, Bedfordshire, and Northamptonshire, the answers are not sufficiently definite to determine. In Cambridgeshire, Oxfordshire, Warwickshire, Wiltshire, and Dorsetshire, greater numbers are calculated upon. In various counties, the attention has not been competent to the procuring data for any estimate of families or individuals.

"9. More than half their number follow no business: some are dealers in horses and asses: while others profess themselves to be farriers, smiths, tinkers, braziers, grinders of cutlery, basket-makers, chair-bottomers, and musicians.

"10. The children are brought up in the habits of their parents, particularly to music and dancing, and are of dissolute habits.

"11. The women mostly carry baskets with trinkets and small wares; and tell fortunes.

"12. They are too ignorant to have acquired accounts of genealogy, and perhaps indisposed by the irregularity of their habits.

"13. In most counties there are particular situations to which they are partial. There is a marsh, near Newbury in Berkshire, much frequented by them; and Dr. Clark states, that in Cambridgeshire, their principal rendezvous is near the western villages.

"14. It cannot be ascertained whether this attachment to particular places has prevailed from their first coming into the nation.

"15, 16, and 17. When among strangers, they elude inquiries respecting their peculiar language, calling it Gibberish. They know of no person that can write it, or of any written specimen of it.

"18. Their habits and customs in all places are peculiar.

"19. Those who profess any religion, represent it to be that of the country in which they reside: but their description of it seldom goes beyond repeating the Lord's Prayer; and only a few of them are capable of that. Instances of their attending any place for worship are very rare.

"20. They marry for the most part by pledging to each other, without any ceremony. A few exceptions have occurred, when money was plentiful.

"21. They do not teach their children religion.

"22, and 23. *Not one in a thousand can read.*"

CHAP. LXXVII

CURIOSITIES IN HISTORY, ETC.—(*Continued.*)

FREE AND ACCEPTED MASONS.—This very ancient society is so called, either from some extraordinary knowledge of masonry, of which they are supposed to be masters, or because the first founders of the society were persons of this profession. They are now very considerable, both on account of their numbers, and the rank they hold in society, being found in every country in Europe, as well as North America; and they consist principally of persons of merit and consideration. They make no small pretensions to antiquity, for they claim a standing of some thousands of years. What the design of their institution is, seems still in some measure a secret: the members are said to be admitted into the fraternity by being put in possession of a great number of secrets, called the *mason's word*, which have been religiously kept from age to age. In a treatise on Masonry, published in 1792, by William Preston, master of the Lodge of Antiquity, the origin of masonry is traced from the creation. "Ever since symmetry began, and harmony displayed her charms, (says he,) our order has had a being." By other accounts the antiquity of masonry has only been traced as far back as the building of Solomon's temple.

In Dr. Henry's history of Great Britain, we find the origin of the Free Mason Society attributed to the difficulty found in former times to procure workmen to build the vast number of churches, monasteries, and other religious edifices, which either the pretended piety or the superstition of those ages prompted the people to raise. Hence the masons were greatly favoured by the popes, and many indulgences were granted, to augment their numbers. In those times, it may well be supposed, that such encouragement from the supreme pastors of the church must have been productive of the most beneficial results to the fraternity; and hence the society rapidly increased. An ancient author, who was well acquainted with their history and constitution, says, "The Italians, with some Greek refugees, and with them French, Germans, and Flemings, joined into a fraternity of architects, procuring papal bulls for their encouragement; they styled themselves *Free Masons*, and ranged from one nation to another, as they found churches to be built: their government was regular; and where they fixed near the building in hand, they made a camp of huts. A surveyor governed in chief; while every tenth man was called a warden, and superintended the other nine

Masonry had a very early introduction into Britain, but never attained to any degree of importance, until the year 557 of the Christian era; when St Austin, with forty monks, among whom the sciences had been preserved, came into England. By these Christianity was propagated; all the kings of the heptarchy were converted; masonry was patronized by St. Austin; and the Gothic style of building was introduced into England, by numerous foreigners, who resorted at this time to the kingdom. Austin appeared at the head of the fraternity in founding the old cathedral of Canterbury, in 600; that of Rochester, in 602; St. Paul's in London, in 604; St. Peter's in Westminster, in 605: to which may be added many others. The number of masons was thus greatly increased, as well as by other buildings, such as castles, &c. throughout the kingdom.

Masonry found a zealous protector in Alfred the Great, the liberal patron of all arts and manufactures. He appropriated a seventh part of his revenue for maintaining a number of masons, whom he employed in rebuilding the cities, castles, &c. ruined by the Danes. Under his successor, Edward, the masons continued to hold their lodges; they were patronized by Ethred, husband to the king's sister, and Ethelwald his brother, to whom the care of this fraternity was entrusted. The latter was a great architect, and founded the university of Cambridge. The complete re-establishment of masonry in England, however, is dated from the reign of king Athelstan: and the grand masons at York trace their existence from this period.

The Grand Lodge of York, the most ancient in England, was founded in 926, under the patronage of Edwin the king's brother, who obtained for them a charter from Athelstan, and became grand-master himself. By virtue of this charter all the masons in the kingdom were convened at a general assembly in that city, where they established a grand lodge for their government; and for many centuries afterwards, no general meetings were held in any other place. Hence the appellation of Ancient York Masons is well known both in Ireland and Scotland; and the general tradition is, that they originated at Auldby near York, which was a seat belonging to Edwin.

It was the glory and boast of the brethren, in almost every country where masonry was established, to be accounted descendants of the original York masons; and from the universality of the idea that masonry was first established at York by charter, the masons of England have received tribute from the first states in Europe. At present, however, this social intercourse is abolished. The duke of Buccleugh, who, in 1723, succeeded the duke of Wharton as grand-master, first

proposed the scheme of raising a general fund for distressed masons. The duke's motion was supported by Lord Paisley, Colonel Houghton, and a few other brethren; and the grand lodge appointed a committee to consider of the most effectual means of carrying the scheme into execution. The disposal of the charity was first vested in seven brethren; but this number being found too small, nine more were added. It was afterwards resolved, that twelve masters of contributing lodges, in rotation with the grand officers, should form the committee; and by another regulation since made, it has been determined that all past and present grand officers, with the masters of all regular lodges, which shall have contributed within twelve months to the charity, shall be members of the committee. This committee meets four times in the year, by virtue of a summons from the grand-master or his deputy. The petitions of the distressed brethren are considered at these meetings; and if the petitioner be considered as a deserving object, he is immediately relieved with five pounds. If the circumstances of the case are of a peculiar nature, his petition is referred to the next communication, where he is relieved with any sum the committee may have specified, not exceeding twenty guineas at one time. Thus the distressed have always found ready relief from this general charity, which is supported by the voluntary contributions of different lodges out of their private funds, without being burdensome to any member in the society. Thus has the committee of charity for free masons been established; and so liberal have the contributions been, that though the sums annually expended, for the relief of the distressed brethren, have for several years past amounted to many thousand pounds, there still remains a considerable fund.

The most remarkable event which of late has taken place in the affairs of masonry, is the initiation of Omitul Omrah Bahauder, eldest son of the nabob of the Carnatic, who was received by the lodge of Trinchinopoly, in the year 1779. The news being officially transmitted to England, the grand lodge determined to send a congratulatory letter to his highness on the occasion, accompanied with an apron elegantly decorated, and a copy of the book of Constitutions superbly bound. The execution of this commission was entrusted to Sir John Duy, advocate-general of Bengal; and in the beginning of 1780, an answer was received from his highness, acknowledging the receipt of the present, and expressing the warmest attachment and benevolence to his brethren in England. The letter was written in the Persian language, and inclosed in an elegant cover of cloth of gold, and addressed to the grand-master and grand lodge of England. A proper reply was made; and a translation of his highness's letter was ordered to be copied

on vellum; and, with the original, elegantly framed and glazed, and hung up in the hall at every public meeting of the society.

It must be natural to inquire into the uses of the institution, and for what purpose it has been patronized by so many great and illustrious personages. The profound secrecy, however, in which every thing relating to masonry is involved, prevents us from being very particular on this head. The masons themselves say in general, that it promotes philanthropy, friendship, and morality; that in proportion as masonry has been cultivated, countries have become civilized, &c. How far this can be depended upon, the fraternity best know. Another advantage, however, seems less equivocal, viz. that its signs serve as a kind of universal language, so that by means of them, people of the most distant nations may become acquainted, and enter into friendship with one another. This certainly must be accounted a very important circumstance; and considering the great numbers that have been, and daily are, admitted to the society, and their inviolable attachment to the art, we must certainly conclude, that if it contains nothing of great importance to mankind at large, it must at least be extremely agreeable, and even fascinating, to those who are once initiated.



CHAP. LXXVIII.

CURIOSITIES IN HISTORY, ETC.—(*Continued.*)

Travelling Faquirs—Long absent Husband returned—Curious Historical Fact—The most Extraordinary Fact on Record.

THE TRAVELLING FAQUIRS.

THE following curious circumstance in natural history is related by a gentleman of veracity, learning, and abilities, who filled a considerable post in the Company's Service in India.—

THE TRAVELLING FAQUIRS in this country are a kind of superstitious devotees, who pretend to great zeal in religion, but are, in fact, the most vicious and profligate wretches in the world. They wander about the country here, as the gipsies

do with you; and having some little smattering of physic, music, or other arts, they introduce themselves by these means wherever they go. One of them called a few days ago at my house, who had a beautiful large snake in a basket, which he made rise up and dance about to the tune of a pipe on which he played.

It happened that my out-house and farm-yard had for some time been infested with snakes, which had killed me several turkeys, geese, ducks, fowls, and even a cow and a bullock. My servants asked this man whether he could pipe these snakes out of their holes, and catch them? He answered them in the affirmative, and they carried him instantly to the place where one of the snakes had been seen. He began piping, and in a short time the snake came dancing to him: the fellow caught him by the nape of the neck, and brought him to me. As I was incredulous, I did not go to see this first operation; but as he took this beast so expeditiously, and I still suspected some trick, I desired him to go and catch another, and went with him myself to observe his motions. He began by abusing the snake, and ordering him to come out of his hole instantly, and not be angry, otherwise he would cut his throat and suck his blood. I cannot swear that the snake heard and understood this elegant invocation. He then began piping with all his might, lest the snake should be deaf; he had not piped above five minutes, when an amazing large cobra capella (the most venomous kind of serpent) popped his head out of a hole in the room. When the man saw his nose, he approached nearer to him, and piped more vehemently, till the snake was more than half out, and ready to make a dart at him; he then piped only with one hand, and advanced the other under the snake as it was raising itself to make the spring. When the snake darted at his body, he made a snatch at his tail, which he caught very dexterously, and held the creature very fast, without the least apprehension of being bit, until my servants dispatched it. I had often heard this story of snakes being charmed out of their holes by music; but never believed it, till I had this ocular demonstration of the fact. In the space of an hour the Faquir caught five very venomous snakes close about my house.*

THE LONG ABSENT HUSBAND RETURNED: (From Dr. King's Anecdotes.)—"About the year 1706, I knew," said Dr. King, "one Mr. Howe, a sensible well-natured man, possessed

* That this method of charming the serpentine race was practised at a very early period of antiquity, appears from the allusion of the holy Psalmist, in the 4th and 5th verses of the 58th Psalm.

of an estate of £700 or £800 per annum; he married a young lady of good family, in the west of England; her maiden name was Mallet; she was agreeable in her person and manners, and proved a very good wife. Seven or eight years after they had been married, he arose one morning very early, and told his wife he was obliged to go to the Tower to transact some particular business: the same day, at noon, his wife received a note from him, in which he informed her that he was under the necessity of going to Holland, and should probably be absent three weeks or a month. He was absent from her seventeen years, during which time she never heard from him or of him. The evening before he returned, while she was at supper, and with some of her friends and relations, particularly one Dr. Rose, a physician, who had married her sister, a billet, without any name subscribed, was delivered to her, in which the writer requested the favour of her to give him a meeting the next evening, in the Birdcage-walk, in St. James's Park. When she had read the billet, she tossed it to Dr. Rose, and laughing, said, 'You see, brother, old as I am, I have got a gallant.' Rose, who perused the note with more attention, declared it to be Mr. Howe's hand-writing: this surprised all the company, and so much affected Mrs. Howe, that she fainted away; however, she soon recovered, when it was agreed that Dr. Rose and his wife, with the other gentlemen and ladies who were then at supper, should attend Mrs. Howe the next evening to the Birdcage-walk: they had not been there more than five or six minutes, when Mr. Howe came to them, and after saluting his friends, and embracing his wife, walked home with her, and they lived together in great harmony from that time to the day of his death. But the most curious part of my tale remains to be related.

"When Howe left his wife, they lived in a house in Jermyn-street, near St. James's church; he went no farther than a little street in Westminster, where he took a room, for which he paid five or six shillings a week, and changing his name, and disguising himself by wearing a black wig, (for he was a fair man,) he remained in this habitation during the whole time of his absence! He had two children by his wife when he departed from her, who were both living at that time; but they both died young, in a few years after. However, during their lives, the second or third year after their father disappeared, Mrs. Howe was obliged to apply for an act of parliament, to procure a proper settlement of her husband's estate, and a provision for herself out of it, during his absence, as it was uncertain whether he was alive or dead; this act he suffered to be solicited and passed, and enjoyed the pleasure of reading the progress of it in the votes, in a little coffee-house which he frequented, near his lodging

"Upon quitting his house and family in the manner I have mentioned, Mrs. Howe at first imagined, as she could not conceive any other cause for such an abrupt elopement, that he had contracted a large debt unknown to her, and by that means involved himself in difficulties which he could not easily surmount; and for some days she lived in continual apprehension of demands from creditors, or seizures, executions, &c. But nothing of this kind happened; on the contrary, he did not only leave his estate free and unencumbered, but he paid the bills of every tradesman with whom he had any dealings; and upon examining his papers, in due time after he was gone, proper receipts and discharges were found from all persons, whether tradesmen or others, with whom he had any manner of transactions or money concerns. Mrs. Howe, after the death of her children, thought proper to lessen her establishment of servants, and the expenses of her housekeeping: and therefore removed from her house in Jermyn-street, to a little house in Brewer-street, near Golden-square. Just over-against her lived one Salt, a corn-chandler. About ten years after Howe's abdication, he contrived to form an acquaintance with Salt, and was at length in such a degree of intimacy with him, that he usually dined with Salt once or twice a week. From the room in which they sat, it was not difficult to look into Mrs. Howe's dining-room, where she generally ate, and received her company; and Salt, who believed Howe to be a bachelor, frequently recommended Mrs. Howe as a suitable match. During the last seven years of this gentleman's absence, he went every Sunday to St. James's church, and used to sit in Mr. Salt's seat, where he had a view of his wife, but could not be easily seen by her. After he returned home, he never would confess, even to his most intimate friends, what was the real cause of such a singular conduct: apparently there was none; but whatever there was, he was certainly ashamed to own it.

"Dr. Rose has often said to me, that he believed his brother Howe would never* have returned to his wife, if the money which he took with him, which was supposed to have been £1000 or £2000, had not been all spent: indeed, he must have been a good economist, and frugal in his manner of living, otherwise his money would scarcely have held out; for I imagine he had his whole fortune by him; I mean what he carried away with him in money and bank-bills: and he daily took out of his bag, like the Spaniard in Gil Blas, what was sufficient for his expenses."

* And yet I have seen him, after his return, addressing his wife in the language of a young bridegroom. And I have been assured, by some of his most intimate friends, that he treated her, during the rest of their lives, with the greatest kindness and affection.

A CURIOUS HISTORICAL FACT.—During the troubles in the reign of Charles I. a country girl came to London, in search of a place as a servant maid; but not succeeding, she hired herself to carry out beer from a brewhouse, and was one of those called tub-women. The brewer, observing a good looking girl in this low occupation, took her into his family as a servant, and, after a short time, married her; but he died while she was yet a young woman, and left her the bulk of his fortune. The business of the brewery was dropped, and the young widow was recommended to Mr. Hyde, as a skilful lawyer to arrange her husband's affairs. Hyde, (who was afterwards the great Earl of Clarendon,) finding her fortune considerable, married her. Of this marriage there was no other issue than a daughter, who was afterwards the wife of James II., and mother of Mary and Anne, queens of England.

The following is said to be **THE MOST EXTRAORDINARY FACT ON RECORD.**—In the appendix to the Rev. John Campbell's Travels in South Africa, is recorded one of the strangest occurrences in the moral annals of mankind. It will be recollected, that some years ago the Grosvenor, East India man, was wrecked off the coast of Caffraria, (a district divided from the country of the Hottentots by the Great Fish River,) and that nearly the whole of the passengers and crew perished on the occasion. It was, however, discovered, that two young ladies had survived the miseries of this dreadful event, and were resident in the interior of a country uninhabited by Europeans. Mr. Campbell does not relate this occurrence from personal evidence, but we cannot doubt the extraordinary fact.

The Landdrost of Graaf Ragrel had been deputed by the British government to pay a visit to the king of Caffraria, for the purpose of ascertaining whether there were any survivors from the wreck of the Grosvenor. Finding there were two females, he succeeded in procuring an introduction to them. He saw them habited like Caffre women; their bodies were painted after the fashion of the native inhabitants; and their manners and appearance were altogether anti-European. The Landdrost, however, sought to obtain their confidence by a liberal offer of his best services to restore them to their country and friends. But they were unmoved by his solicitations. They stated that they had fallen into the hands of the natives after they had been cast ashore from the wreck; that their companions had been murdered, and that they had been compelled to give themselves in marriage; that having affectionate husbands, children, and grand-children, their attachments were bounded by their actual enjoyments. Upon being repeatedly urged to depart with the Landdrost, they replied,

that probably at their return to England they might find themselves without connections or friends, and that their acquired habits ill fitted them to mingle with polished society; in short, that they would not quit Caffraria.

Such, then, is the powerful influence of habit! Two young ladies, highly educated and in all probability lovely in their persons, are taught by habit to forget those scenes of gaiety they were so well calculated to ornament, and the anticipated enjoyments of high matrimonial connections; to forget their parents, their relations, the accomplished companions of their youth, and all the refinements of life! Among a savage people, they acquire congenial feelings, and their vitiated nature ceases to repine: they love the untutored husbands given to them by fate; they rear their children in the stupidity of Hottentot faith; they designate their wretched hovel with the sacred name of Home; they expel memory from their occupations; and regret no longer mingles with their routine of barbarous pleasures. Is this, in reality, a picture of the human mind, with all its boasted attributes, its delicacies, its refinements, its civilized superiority? Yes! for custom is a second nature.

This fact is also related by Vaillant, in his *Travels in the interior parts of Africa*. He says, volume i. page 286, "I was told, almost six weeks prior to my visiting that coast, that an English vessel had been wrecked on these barbarous shores; that being driven on the sands, a part of the crew had fallen into the hands of the Caffres, who had put them all to death, except a *few women*, whom they had *cruelly reserved*."

UNFORTUNATE ARTIFICER.—There was an artificer in Rome, who made vessels of glass of so tenacious a temper, that they were as little liable to be broken as those that are made of gold and silver: when therefore he had made a vial of the purer sort, and such as he thought a present worthy of Cæsar alone, he was admitted into the presence of their then Emperor Tiberius. The gift was praised, the skilful hand of the artist applauded, and the donation of the giver accepted. The artist, that he might enhance the wonder of the spectators, and promote himself yet further in the favour of the Emperor, desired the vial out of Cæsar's hand, and threw it with such force against the floor, that the most solid metal would have received some damage or bruise thereby. Cæsar was not only amazed, but affrighted with the act; but he, taking up the vial from the ground, (which was not broken, but only bruised together, as if the substance of the glass had put on the temperature of brass,) he drew out an instrument from his bosom, and beat it out to its former figure. This done, he imagined that he had conquered the world, as believing that he had

merited an acquaintance with Cæsar, and raised the admiration of all the beholders; but it fell out otherwise, for the Emperor inquired if any other person besides himself was privy to the like tempering of glass? When he had told him, "No," he commanded his attendants to strike off his head, saying, "That should this artifice come once to be known, gold and silver would be of as little value as the dirt of the street." Long after this, viz. in 1610, we read, that amongst other rare presents, then sent from the Sophy of Persia to the king of Spain, were six mirrors of malleable glass, so exquisitely tempered that they could not be broken.



CHAP. LXXIX.

CURIOSITIES IN HISTORY, ETC.—(Concluded.)

Great Events from Little Causes—Dreadful Instances of the Plague, in Europe—Fire of London—Vicar of Bray—Curious Account of the Ceremonies at Queen Elizabeth's Dinner—A Blacksmith's Wife become a Queen—Swine's Concert.

* GREAT EVENTS FROM LITTLE CAUSES.—The most important events sometimes take place from little and insignificant causes.

1. Sir Isaac Newton's sublime genius, set a-going by the fall of an apple, never stopped till it had explained the laws of nature.

2. Hospinian (who wrote so successfully against the Popish ceremonies) was first convinced of the necessity of such a work by the talk of an ignorant country landlord, who thought that religious fraternities were as old as the creation, that Adam was a monk, and that Eve was a nun.

3. Metius was led to the discovery of optic glasses, by observing some schoolboys play upon the ice, who made use of their copy-books, rolled up in the shape of tubes, to look at each other, to which they sometimes added pieces of ice at the end, to view distant objects.

4. Luther's quarrelling with Pope Leo. X. and bringing himself into difficult and dangerous circumstances, perhaps led him to search, think, and judge for himself, and consult the scriptures; by which he overthrew errors, which had been received as truths for ages.

5. To this we may add the marriage of Henry VIII. with Ann Boleyn, which was the occasion of England's renouncing the supremacy of the Pope, and of bringing about the Reformation.

6. "An apothecary's chariot (says one) very probably produced No. 45. of the North Briton, and its consequences the American war, the French revolution, and the dreadful events that have since taken place in Europe."

DREADFUL INSTANCES OF THE PLAGUE, IN EUROPE.—Thucydides, lib. ii. gives an account of a dreadful plague which happened in Athens about B. C. 430, and with which he was himself infected, while the Peloponnesians under the command of Archidamus wasted all her territory abroad; but of these two enemies the plague was by far the most severe. The most dreadful plague that ever raged at Rome, was in the reign of Titus, A. D. 80. The emperor left no remedy unattempted to abate the malignity of the distemper, acting during its continuance like a father to his people. The same fatal disease raged in all the provinces of the Roman empire in the reign of M. Aurelius, A. D. 167, and was followed by a dreadful famine, earthquakes, inundations, and other calamities. About A. D. 430, the plague visited Britain, just after the Picts and Scots had made a formidable invasion of the southern part of the island. It raged with uncommon fury, and swept away most of those whom the sword and famine had spared, so that the living were scarcely sufficient to bury the dead. About A. D. 1348, the plague became almost general over Europe. Many authors give an account of this plague, which is said to have appeared first in the kingdom of Kathay, in 1346, and to have proceeded gradually west to Constantinople and Egypt. From Constantinople it passed into Greece, Italy, France, and Africa, and by degrees along the coast of the ocean into Britain and Ireland, and afterwards into Germany, Hungary, Poland, Denmark, and the other northern kingdoms. According to Antonius, arch bishop of Florence, the distemper carried off 60,000 people in that city. In 1656, the plague was brought from Sardinia to Naples, being introduced into the city by a transport with soldiers on board. It raged with excessive violence, carrying off, in less than six months, 400,000 of the inhabitants. In 1720, the city of Marseilles was visited with this destructive disease, brought in a ship from the Levant; and in seven months, during which time it continued, it carried off not less than 60,000 people. The ravages of this disease have been dreadful wherever it has made its appearance. On the first arrival of the Europeans at the island of Grand Canaria, it contained 14,000 fighting men; soon after which, two-thirds of these inhabitants fell a sacrifice to the plague. The destruction it has made in Turkey in Europe, and particularly in Constantinople, must be known to every reader; and its fatal effects have been particularly heightened there by that firm

belief which prevails among the people of predestination, &c. It is generally brought into European Turkey from Egypt, where it is very frequent, especially at Grand Cairo. To give even a list of all the plagues which have desolated many flourishing countries, would extend this article beyond all bounds, and minutely to describe them all is impossible. Respecting the plague which raged in Syria in 1760, we refer to the Abbe Mariti's *Travels through Cyprus, Syria, and Palestine*, volume i. pages 278, 296. This plague was one of the most malignant and fatal that Syria ever experienced; for it scarcely had made its appearance in any part of the body, before it carried off the patient.

Some particulars respecting **THE GREAT FIRE OF LONDON**.—The following is part of the inscription on the Monument, which records this calamitous event “The second day of September, 1666, at the distance of two hundred and two feet, the height of this column, a terrible fire broke out about midnight. It consumed in its progress eighty-nine churches, the city gates, Guildhall, many public structures, hospitals, schools, libraries; a vast number of stately edifices, thirteen thousand two hundred dwelling-houses, and four hundred streets. The ruins of the city were four hundred and thirty-six acres, from the Tower by the Thames side to the Temple church, and from the north-east gate along the city wall, to Holborn bridge. Three days after, when this fatal fire had baffled all human counsels and endeavours, it stopped, as it were by a command from Heaven, and was on every side extinguished.”

VICAR OF BRAY.—Every one has frequently heard this reverend son of the church mentioned; probably his name may have outlived the recollection of his pious manœuvres: he was in his principles a Sixtus the Fifth. The vicar of Bray, in Berkshire, was a Papist under the reign of Henry the Eighth, and a Protestant under Edward the Sixth; he was a Papist again under Mary, and once more became a Protestant in the reign of Elizabeth. When this scandal to the gown was reproached for his versatility of religious creeds, and taxed for being a turn-coat and an inconstant changeling, as Fuller expresses it, he replied, “Not so, neither! for if I changed my religion, I am sure I kept true to my principle; which is, to live and die the Vicar of Bray!”

This vivacious and reverend hero has given birth to a proverb peculiar to his county, “The Vicar of Bray will be Vicar of Bray still.” Fuller tells us, in his facetious chronicle of his Worthies, that this vicar had seen some martyrs burnt two miles off at Windsor, and found this fire too hot for his

tender temper. He was one of those who, though they cannot turn the wind, will turn their mills, and set them so, that wheresoever it bloweth, their grist shall certainly be ground.

The following ACCOUNT OF THE CEREMONIES AT QUEEN ELIZABETH'S DINNER, deserves to be recorded.—A German traveller, (Hentzner) talking of Queen Elizabeth, thus describes the solemnity of her dinner. "While she was at prayers, we saw her table set out in the following solemn manner: a gentleman entered the room, bearing a rod, and along with him another who had a table-cloth, which, after they had both kneeled three times with the utmost veneration, he spread upon the table; and, after kneeling again, they both retired. Then came two others, one with the rod again, the other with a salt-cellar, a plate, and bread: when they had kneeled, as the others had done, and placed what was brought upon the table, they too retired with the same ceremonies performed by the first. At last came an unmarried lady, (we were told she was a countess,) and along with her a married one, bearing a lasting knife: the former, who was dressed in white silk, when she had prostrated herself three times in the most graceful manner, approached the table, and rubbed the plates with bread and salt, with as much care as if the queen had been present: when they had waited there a little while, the yeomen of the guard entered, bareheaded, clothed in scarlet, with a golden rose upon their backs, bringing in at each turn a course of twenty-four dishes, served in plate, most of it gilt; these dishes were received by a gentleman in the same order they were brought, and placed upon the table, while the lady-taster gave to each of the guards a mouthful to eat, of the particular dish he had brought, for fear of any poison. During the time that this guard, which consists of the tallest and stoutest men that could be found in all England, were bringing dinner, twelve trumpets and two kettle-drums made the hall ring for half an hour together. At the end of this ceremonial, a number of unmarried ladies appeared, who, with particular solemnity, lifted the meat off the table, and conveyed it into the queen's inner and more private chamber, where, after she had chosen for herself, the rest went to the ladies of the court."

A BLACKSMITH'S WIFE BECAME A QUEEN.—It is a curious circumstance, that the present queen of the Sandwich islands, was formerly, or rather is at this time, the wife of a Russian blacksmith. An English vessel lying off what we usually call the Fox Island, several years ago, one of the officers became enamoured of the fair spouse of a son of Vulcan

there; and, his passion being returned, he contrived to smuggle her on board the vessel, and keep her there concealed without the knowledge of his captain, till they had cleared the port.

In the course of the voyage, however, the circumstance became known to the captain, who being highly enraged at such a breach of faith and discipline, kept her confined till they arrived at the Sandwich Islands, where she was put on shore. The forlorn Ariadne, however, found a Bacchus for her Theseus,—a royal lover, to replace her lost lieutenant. The king of the island became enamoured of the fair Russian made her his wife, and raised her to his throne. He was no every-day king. He was a statesman and a hero, though we should call him a savage. He progressively created a respectable navy of several well-built frigates; taught his subjects to be excellent sailors; raised armies; subdued the surrounding islands; and at the close of a prosperous reign, left his possessions and his sovereignty to his queen, who now reigns as his successor. She is well obeyed by her subjects; possesses great wealth in flocks, herds, and rice-ground; and sends frequent presents to her former deserted husband, who still continues to hammer horses' shoes in a Russian colony, while his faithless, but it seems not quite ungrateful spouse, stretches her sceptre over several prosperous isles.

THE SWINE'S CONCERT.—The abbot of Baigue, a man of great wit, and who had the art of inventing new musical instruments, being in the service of Louis XI. king of France, was ordered by that prince to get him a concert of swine's voices, thinking it impossible. The abbot was not surprised but asked money for the performance, which was immediately delivered him; and he wrought a thing as singular as ever was seen. For out of a great number of hogs, of several ages, which he got together, and placed under a tent or pavilion covered with velvet, before which he had a table of wood painted, with a certain number of keys, he made an organical instrument; and as he played upon the said keys, he, by means of little spikes, which pricked the hogs, made them cry in such order and consonance, as highly delighted the king and all his company.

CHAP. LXXX.

CURIOSITIES OF LITERATURE.

Origin of the Materials of Writing—Minute Writing—Titles of Books—Literary Labour and Perseverance—Curious Account of the Scarcity of Books—Celebrated Libraries—Book of Blunders—Curious Account of the Means of Intellectual Improvement in London.

“Of all the pleasures, noble and refin’d,
Which form the taste and cultivate the mind;
In ev’ry realm where science darts its beam,
From Zembla’s ice to Afric’s golden stream;
From climes where Phœbus pours his orient ray,
To the fair regions of declining day:
The ‘feast of reason’ which from reading springs,
To reas’ning man the highest solace brings.
Tis books a lasting pleasure can supply,
Charm while we live, and teach us how to die.”

ORIGIN OF THE MATERIALS OF WRITING.—The most ancient mode of writing was on bricks, and on tables of stone, afterwards on plates of various materials, on ivory, on the bark of trees, and on their leaves.

Specimens of most of these modes of writing may be seen in the British Museum. No. 3478, in the Sloanian library, is a Nabob’s letter, on a piece of bark about two yards long, and richly ornamented with gold. No. 3207, is a book of Mexican hieroglyphics, painted on bark. In the same collection are various species, many from the Malabar coast, and other parts of the East. The latter writings are chiefly on leaves. The prophecies of the Sibyls were on leaves. There are several copies of Bibles written on palm-leaves, still preserved in various collections in Europe. The ancients, doubtless, wrote on any leaves they found adapted for the purpose. Hence the leaf of a book, as well as that of a tree, is derived.

In the book of Job, mention is made of writing on stone, and on sheets of lead. The law of Moses was written on stone. Hesiod’s works were written on leaden tables; lead was used for writing, and rolled up like a cylinder, as Pliny states. The laws of the Greeks were engraven on bronze tables. In the shepherd state, they wrote their songs with thorns and awls, on leather. The Icelanders wrote on walls; and Olaf, according to one of the sagas, built a large house, on the balks and spars of which he had engraven the history of his own and more ancient times; while another northern hero appears to have had nothing better than his own chair and

bed, on which to perpetuate his own heroic acts. The Arabs took the shoulder-bones of sheep, on which they carved remarkable events with a knife, and after tying them with a string, they hung these chronicles up in their cabinets.

These early inventions led to the discovery of tablets of wood; and as cedar is incorruptible, from its bitterness, they chose this wood for cases or chests to preserve their most important writings. From this custom arises the celebrated expression of the ancients, when they meant to give the highest eulogium of an excellent work, *et cedro digna locuti*; that it was worthy to be written on cedar. These tablets were made of the trunks of trees; the use of them still exists, but in general they are made of other materials than wood. The same reason which led them to prefer the cedar to other trees, induced them to write on wax, which is incorruptible from its nature. Men generally used it to write their testaments, in order the better to preserve them: thus Juvenal says, *Cerus implere capaces*. This thin paste of wax was also spread on tablets of wood, that it might more easily admit of erasure.

They wrote with an iron bodkin, as they did on the other substances we have noticed. The *stylus* was made sharp at one end to write with, and blunt and broad at the other to deface and correct easily; hence the phrase *vertere stylum*, to turn the stylus, was used to express blotting out. But the Romans forbade the use of this sharp instrument, from the circumstance of many persons having used them as daggers. A schoolmaster was killed by the *pugillares*, or table-book, and the styles of his own scholars. They substituted a stylus made of the bone of a bird, or other animal, so that their writings resembled engravings. When they wrote on softer materials, they employed reeds and canes, split like our pens at the points, which the Orientalists still use to lay their colour or ink neater on the paper.

By the word *pen* in the translation of the Bible, we are to understand an iron style. Table-books of ivory are still used for memoranda, written by black-lead pencils. The Romans used ivory to write the edicts of the senate on; and the expression of *libris elephantinis*, which, some authors imagine, alludes to books which for their size were called *elephantine*, others more rationally conclude, were composed of ivory, the tusk of the elephant.

Pumice was likewise a writing material of the ancients, which they used to smooth the roughness of the parchment, or to sharpen their reeds.

In the progress of time, the art of writing consisted in painting with different kinds of ink. This novel mode of writing occasioned them to invent other materials proper to receive their writing. They now chose the thin bark of certain trees

and plants; they wrote on linen, and at length, when this was found apt to become mouldy, they prepared the skins of animals. Those of asses are still in use; and on those of serpents, &c. were once written the Iliad and Odyssey. The first place where they began to dress these skins was Pergamus, in Asia; whence the Latin name is derived of *Pergamena*, or parchment. These skins are, however, better known amongst the authors of the purest Latin, under the name of *membrana*, so called from the membranes of animals of which they were composed. The ancients had parchments of three different colours, white, yellow, and purple. At Rome, white parchment was disliked, because it was more subject to be soiled than the others, and dazzled the eye. They generally wrote letters of gold and silver on purple or violet parchment. This custom continued in the early ages of the church; and copies of the Evangelists of this kind are preserved in the British Museum.

When the Egyptians employed for writing the bark of a plant or reed, called *papyrus*,* or paper-rush, it superseded all former modes, because this was the most convenient. Formerly there grew great quantities of it on the sides of the Nile. It is this plant which has given the name to our paper, although the latter is composed of linen or rags. After the eighth century the papyrus was superseded by parchment. The Chinese make their paper with silk. The use of paper is of great antiquity; it is what the ancient Latinists call *charta*, or *charta*. Before the use of parchment and paper passed to the Romans, they contrived to use the thin peel which was found on trees, between the wood of these trees and their bark. This second skin they called *liber*, whence the Latin word *liber*, a book, and library and librarian, in the European languages, and the French *livre* for book; but we of northern origin derive our book from the Danish *bog*, the beech-tree, because that being the most plentiful in Denmark, was used to engrave on. Anciently, instead of folding this bark, this parchment, or paper, as we fold ours, they rolled it according as they wrote on it; and the Latin name which they gave these rolls has passed into our language as well as the others. We say a volume or volumes, although our books are composed of pages cut and bound together. The books of the ancients on the shelves of their libraries, were rolled up on a pin, and placed erect, titled on the outside in red letters, or rubrics, and appeared like a number of small pillars on the shelves.

Curious information respecting small, or MINUTE WRITING.—The Iliad of Homer in a nut-shell, which Pliny says

* A specimen of the papyrus is to be seen at the British Museum; it is the first known in England. It was brought by Mr. Bruce, and given to Sir Joseph Banks, who presented it to the British Museum.

that Cicero once saw, it is pretended might have been a fact, however to some it may appear impossible. Ælian notices an artist who wrote a distich in letters of gold, which he inclosed in the rind of a grain of corn.

Antiquity, and modern times, have recorded many penmen, whose glory consisted in writing so small a hand, that it could not be legible to the naked eye. One wrote a verse of Homer on a grain of millet; and another, more indefatigably industrious in this important trifling, is said by Menage to have written whole sentences which were not perceptible to the eye without the microscope: pictures and portraits, also, appeared at first to be lines and scratches thrown down at random; one of these formed the face of the Dauphiness, with the most pleasing delicacy and correct resemblance. He read an Italian poem in praise of this princess, containing some thousands of verses, written by an officer, in the space of a foot and a half. This species of curious idleness has not been lost in our own country: about a century ago, this minute writing was a fashionable curiosity. A drawing of the head of Charles I. is in the library of St. John's college, at Oxford. It is wholly composed of minute written characters, which at a small distance resemble the lines of engraving. The lines of the head and ruff, are said to contain the book of Psalms, the Creed, and the Lord's Prayer. In the British Museum we find a drawing representing the portrait of Queen Anne, not much above the size of the hand. On this drawing appear a number of lines and scratches, which, the librarian assures the marvelling spectator, includes the entire contents of a thin folio volume, that on this occasion is carried in the hand, as if to vouch for the truth of a statement so liable to be received with hesitation.

On this subject it may be worth noticing, that the learned Huet asserts that he, like the rest of the world, for a long time considered as a fiction the story of that industrious writer, who is said to have inclosed the Iliad in a nut-shell. But having examined the matter more closely, he thought it possible. One day, in company at the Dauphin's, this learned man trifled half a hour in proving it. A piece of vellum, about ten inches in length and eight in width, pliant and firm, can be folded up and enclosed in the shell of a large walnut. It can hold in its breadth one line, which can contain 30 verses, and in its length 250 lines. With a crow-quill the writing can be perfect. A page of this vellum will then contain 7500 verses, and the reverse as much; the whole 15,000 verses of the Iliad. And this he proved in their presence, by using a piece of paper, and with a common pen. The thing is possible to be effected; and if some occasion should happen, when paper is excessively rare, it may be

useful to know, that a volume of matter may be contained in a very small space.

We submit the following curious particulars respecting the TITLES OF BOOKS.—The Jewish, and many Oriental authors, were fond of allegorical titles, which always shews the most puerile age of taste. The titles were usually adapted to their obscure works. It might exercise an able enigmatist to explain their allusions; for we must understand by “The Heart of Aaron,” a commentary on several of the prophets. “The Bones of Joseph” is an introduction to the Talmud. “The Garden of Nuts,” and “The Golden Apples,” are theological questions, and “The Pomegranate with its Flower,” is a treatise of ceremonies no longer practised. Jortin gives a title, which he says, of all the fantastical titles he can recollect, is one of the prettiest. A Rabbin published a catalogue of Rabbinical writers, and called it *Latia Dormientium*, from Cantic. vii. 9. “Like the best wine of my beloved, that goeth down sweetly, causing the lips of those that are asleep to speak.” It has a double meaning, of which he was not aware, for most of his Rabbinical brethren talk very much like men in their sleep.

Almost all their works bearsuch titles as, Bread, Gold, Silver, Roses, Eyes, &c.; in a word, any thing that meant nothing.

Affected title-pages were not peculiar to the Orientalists; but the Greeks and the Romans have shewn a finer taste. They had their Cornucopias, or horns of abundance; Limones, or meadows; Pinakidions, or tablets; Pancarpes, or all sorts of fruits: titles not unhappily adapted for the miscellanists. The nine books of Herodotus, and the nine epistles of Æschines, were respectively honoured by the name of a Muse; and three orations of the latter, by those of the Graces.

The modern fanatics have had a most barbarous taste for titles. We could produce numbers from abroad, and also at home. Some works have been called, “Matches Lighted at the Divine Fire,” and one “The Gun of Penitence:” a collection of passages from the Fathers, is called, “The Shop of the Spiritual Apothecary:” we have “The Bank of Faith,” and “The Sixpennyworth of Divine Spirit:” one of these works bears the following elaborate one; “Some fine Baskets baked in the Oven of Charity, carefully conserved for the Chickens of the Church, the Sparrows of the Spirit, and the sweet Swallows of Salvation.” Sometimes their quaintness has some humour. One Sir Humphrey Lind, a zealous puritan, published a work, which a Jesuit answered by another, entitled, “A Pair of Spectacles for Sir Humphrey Lind.” The doughty knight retorted, by “A Case for Sir Humphrey Lind’s Spectacles.”

Some of these obscure titles have an entertaining absurdity; as, "The Three Daughters of Job," which is a treatise on the three virtues of patience, fortitude, and pain. "The Innocent Love, or the Holy Knight," is a description of the ardours of a saint for the Virgin. "The Sound of the Trumpet," is a work on the day of judgment; and "A Fan to drive away Flies," is a theological treatise on purgatory.

The title which George Gascoigne, who had great merit in his day, has given to his collection, may be considered as a specimen of the titles of his times. It was printed in 1576. He calls it "A hundred sundrie Floures bounde up in one small Poesie; gathered partly by translation in the fyne and outlandish gardens of Euripides, Ovid, Petrarche, Ariosto, and others; and partly by invention out of our own fruitefull orchardes in Englande; yielding sundrie sweet savours of tragical, comical, and morall discourses, both pleasaunt and profitable to the well-swelling noses of learned readers."

LITERARY LABOUR AND PERSEVERANCE.—The Rev. William Davy, curate of Lustleigh, Devon, in the year 1807, finished a work in twenty-six volumes, of which the following is the title:—

"A System of Divinity, in a Course of Sermons on the first Institutions of Religion—on the Being and Attributes of God—on some of the most important Articles of the Christian Religion, in Connection—and on the several Virtues and Vices of Mankind; with Occasional Discourses. Being a Compilation of the best Sentiments of the Polite Writers and eminent sound Divines, both ancient and modern, on the same subjects, properly connected, with Improvements; particularly adapted for the Use of Chief Families, and Students in Divinity, for Churches, and for the Benefit of Mankind in general."

The author of the work bearing this astounding title, once attempted to publish it by subscription; in which he failed: he being poor, and unable to venture its publication, resolved to print it himself; for which purpose he procured as many worn-out types from a country printing-office as enabled him to print two pages at once; which, with the addition of a press of his own manufacture, he set to work in the year 1795, serving every office himself, from compositor to printer's-devil; and proceeding regularly page by page, he struck off forty copies of the first three hundred pages, half of which he distributed among the reviews, the bishops, and the universities, with a view of attracting public attention; but here also he failed: when he became determined to treat a misjudging world with contempt, and accordingly continued to print off fourteen copies of each, and at the end of twelve years finished the whole six-and-twenty volumes.

Curious account of the SCARCITY OF BOOKS.—Of the scarcity and value of books during the seventh and many subsequent centuries, the following curious account is given by Mr. Warton, in his *History of English Poetry*, vol. i. “Towards the close of the seventh century, (says he,) even in the papal library at Rome, the number of books was so inconsiderable, that pope St. Martin requested Sanctamand, bishop of Maestricht, if possible, to supply this defect from the remotest parts of Germany. In 855, Lupus, abbot of Ferriers, in France, sent two of his monks to pope Benedict III. to beg a copy of *Cicero de Oratore*, and Quintilian’s *Institutes*, and some other books: ‘for (says the abbot) although we have part of these books, yet there is no whole or complete copy of them in all France.’ Albert, abbot of Gemblours, who with incredible labour and immense expense had collected one hundred volumes on theological, and fifty on profane subjects, imagined he had formed a splendid library. About A. D. 790, Charlemagne granted an unlimited right of hunting, to the abbot and monks of Sithin, for making covers for their books of the skins of the deer they killed. These religious were probably more fond of hunting than reading; and, under these circumstances, did not manufacture many volumes. At the beginning of the tenth century, books were so scarce in Spain, that one copy of the Bible, St. Jerome’s epistles, and some volumes of ecclesiastical offices and martyrologies, often served several different monasteries. In an inventory of the goods of John de Pontissara, bishop of Winchester, in his palace of Wulvesey, all the books are only *septemdecim speciem librorum de diversis scientiis*. This was in 1294. The same prelate, in 1299, borrows of his cathedral convent of St. Swithin, at Winchester, *Bibliam bene glossatam*; i. e. the Bible with marginal annotations, in two large folio volumes; but gives a bond for due return of the loan, drawn up with great solemnity. This Bible had been bequeathed to the convent by Pontissara’s predecessor, bishop Nicholas de Ely: and in consideration of so important a bequest, *pro bona Biblia dicti episcopi bene glossata*, and one hundred marks in money, the monks founded a daily mass for the soul of the donor. When a single book was bequeathed to a friend, it was seldom without many restrictions. If any person gave a book to a religious house, he believed that so valuable a donation merited eternal salvation; and he offered it on the altar with great ceremony. The most formidable anathemas were peremptorily denounced against those who should dare to alienate a book presented to the cloister, or library of a religious house. The prior and convent of Rochester declare, that they will every year pronounce the irrevocable sentence of damnation on him who shall purloin or conceal a Latin translation of Aristotle’s

Physics, or even obliterate the title. Sometimes a book was given to a monastery, on condition that the donor should have the use of it during his life; and sometimes to a private person, on the terms that he who received it should pray for the soul of his benefactor. When a book was bought, the affair was of so much importance, that it was customary to assemble persons of consequence and character, and to make a formal record that they were present.

Among the royal manuscripts in the book of the Sentences of Peter Lombard, an archdeacon of Lincoln has left this entry: "This book of the Sentences belongs to master Robert, archdeacon of Lincoln, which he bought of Geoffrey the chaplain, brother of Henry, vicar of Northelkington, in the presence of master Robert de Lee, master John of Lirling, Richard of Luda, clerk, Richard the almoner, the said Henry the vicar, and his clerk, and others: and the said archdeacon gave the said book to God and St. Oswald, and to Peter abbot of Barton, and the convent of Barden." The disputed property of a book often occasioned the most violent altercations. Many claims appear to have been made to a manuscript of Matthew Paris, belonging to the last mentioned library; in which John Russel, bishop of Lincoln, conditionally defends or explains his right of possession; and concludes thus, A. D. 1488, "Whoever shall obliterate or destroy this writing, let him be anathema."

About 1225, Roger de Insula, dean of York, gave several Latin Bibles to the university of Oxford, on the condition, that the students who perused them should deposit a cautionary pledge. The library of that university, before A. D. 1300, consisted only of a few tracts, chained or kept in chests in the choir of St. Mary's church. In 1327, the scholars and citizens of Oxford pillaged the opulent Benedictine abbey of the neighbouring town of Abingdon. Among the books they found there, were one hundred psalters, as many grayles, forty missals, which undoubtedly belonged to the choir of the church, and twenty-two codices, on common subjects. And although the invention of paper, at the close of the eleventh century, contributed to multiply manuscripts, and consequently to facilitate knowledge, yet, even so late as the reign of Henry VI. the following remarkable instance occurred of the inconveniences and impediments to study, which must have been produced by a scarcity of books. It is in the statutes of St. Mary's college at Oxford, founded as a seminary to Oseney abbey, in 1446: "Let no scholar occupy a book in the library above one hour, or two hours at most; so that others shall not be hindered from the use of the same!" The famous library established in the university of Oxford, by that munificent patron of literature, Humphrey duke of Gloucester,

contained only six hundred volumes. About the commencement of the fourteenth century, there were only four classics in the royal library at Paris. There was one copy of Cicero, Ovid, Lucan, and Boetius. The rest were chiefly books of devotion, which included but few of the Fathers; many treatises of astrology, geomancy, chiromancy, and medicine, originally written in Arabic, and translated into Latin or French: pandects, chronicles, and romances. This collection was principally made by Charles V. who began his reign in 1365. This monarch was passionately fond of reading; and it was the fashion to send him presents of books from every part of the kingdom of France. These he ordered to be elegantly transcribed, and richly illuminated; and he placed them in a tower of the Louvre, from thence called *La Toure de la Libraire*. The whole consisted of nine hundred volumes. They were deposited in three chambers, wainscoted with Irish oak, and ceiled with cypress curiously carved. The windows were of painted glass, fenced with iron bars and copper wire. The English became masters of Paris in the year 1425; on which event the Duke of Bedford, regent of France, sent the whole library, then consisting of only eight hundred and fifty-three volumes, and valued at 2223 livres, into England; where perhaps they became the groundwork of Duke Humphrey's library. Even so late as the year 1471, when Louis XI. of France borrowed the works of the Arabian physician, Rhasis, from the faculty of medicine at Paris, he not only deposited by way of pledge a quantity of valuable plate, but was obliged to procure a nobleman to join with him as a surety in a deed, by which he bound himself to return it, under a considerable forfeiture. The excessive prices of books in the middle ages afford numerous and curious proofs of the caution with which literary property was secured in those times of general ignorance.

In 1174, Walter, prior of St. Swithin's at Winchester, a writer in Latin of the lives of the bishops who were his patrons, purchased of the monks of Dorchester, in Oxfordshire, Bede's Homilies and St. Austin's Psalter, for twelve measures of barley, and a pall, on which was richly embroidered in silver the history of St. Birinus converting a Saxon king. Among the royal manuscripts in the British Museum, there is Comestor's Scholastic History in French; which, as it is recorded in a blank page at the beginning, was taken from the king of France at the battle of Poitiers; and being purchased by William Montague, Earl of Salisbury, for 100 marcs, was ordered to be sold by the last will of his countess, Elizabeth, for 40 livres. About A. D. 1400, a copy of John of Meun's Romance de la Rose, was sold before the palace gate at Paris for a sum equal to £33. 6s. 6d.

CELEBRATED LIBRARIES.—The first who erected a library at Athens was the tyrant Pisistratus. This was transported by Xerxes into Persia, and afterwards brought back by Seleucus Nicanor to Athens. Plutarch says, that under Eumenes there was a library at Pergamus which contained two hundred thousand books. That of Ptolemy Philadelphus, according to A. Gellius, contained forty thousand, which were all burnt by Cæsar's soldiers. The celebrated library of Alexandria, begun by Ptolemy Soter, and enlarged by his successors, consisting of seven hundred thousand volumes, contained nearly all the literary treasures of the world. This was burnt by order of the Caliph Omar, in the seventh century, and the loss must for ever remain irreparable. On this calamity, literature can never reflect without a sigh. Constantine and his successor erected a magnificent one at Constantinople, which in the eighth century contained three hundred thousand volumes, and among the rest, one in which the Iliad and Odyssey were written in letters of gold, on the entrails of a serpent; but this library was burnt, by order of Leo Isaurus. The most celebrated libraries of ancient Rome, were the Ulpian and the Palatine; and in modern Rome, that of the Vatican, the foundation of which was laid by Pope Nicholas in the year 1450. It was afterwards diminished in the sacking of Rome by the constable of Bourbon, and restored by Pope Sixtus V. and has been considerably enriched with the ruins of that of Heidelberg, plundered by count Tilly in 1682. One of the most complete libraries in Europe, was that erected by Cosmo de Medicis; though it was afterwards exceeded by that of the French king, which was begun by Francis I. augmented by cardinal Richelieu, and completed by M. Colbert. The emperor's library at Vienna, according to Lambecius, consists of eighty thousand volumes, and fifteen thousand nine hundred and forty curious medals. The Bodleian library at Oxford exceeds that of any university in Europe, and even those of any of the sovereigns, except those of the emperors of France and Germany, which are each of them older by a hundred years. It was first opened in 1602, and has since been increased by a great number of benefactors: indeed the Medicean library, that of Bessarion at Venice, and those just mentioned, exceed it in Greek manuscripts, but it outdoes them all in Oriental manuscripts; and as to printed books, the Ambrosian at Milan, and that of Wolfenbuttle, are two of the most famous libraries on the continent, and yet both are considerably inferior to the Bodleian. The Cottonian library consists wholly of manuscripts, particularly of such as relate to the history and antiquities of England; which, as they are now bound, make about one thousand volumes.

BOOK OF BLUNDERS.—One of the most egregious, shall we add illustrious, of all literary blunders, is that of the edition of the Vulgate, by Sixtus V. His holiness carefully superintended every sheet as it passed through the press; and, to the amazement of the world, the work remained without a rival—it swarmed with errata! A multitude of scraps were printed, to paste over the erroneous passages, in order to give the true text. The book makes a whimsical appearance with these pasted corrections; and the heretics exulted in the demonstration of papal infallibility! The copies were called in, and violent attempts made to suppress it; however, a few still remain for the pursuit of biblical collectors: at a late sale, the Bible of Sixtus V. fetched above sixty guineas—a tolerable sum for a mere book of blunders! The world was highly amused at the bull of the Pope and editor prefixed to the first volume, which excommunicates all printers, &c. who in reprinting the work should make any alteration in the text!

Curious account of THE MEANS OF INTELLECTUAL IMPROVEMENT IN LONDON.—The following is an estimate made of the means of intellectual improvement in London. There are four hundred and seven places of public worship; four thousand and fifty seminaries for education, including two hundred and thirty-seven parish charity schools; eight societies for the express purpose of promoting good morals; twelve societies for promoting the learned, the useful, and the polite arts; one hundred and twenty-two asylums and alms-houses for the helpless and indigent, including the Philanthropic Society for reclaiming criminal children; thirty hospitals and dispensaries for sick and lame, and for the delivery of poor pregnant women; seven hundred friendly or benefit societies; about thirty institutions for charitable and humane purposes; about thirty institutions for teaching some thousands of poor children the arts of reading, writing, and arithmetic, on the plans of Mr. Lancaster and Dr. Bell; and these several establishments, including the poor's rate, are supported at the almost incredible cost of one million per annum.

CHAP. LXXXI.

CURIOSITIES OF LITERATURE.—(Continued.)

Origin of the Word "News"—Origin of Newspapers—Instances of New Studies in Old Age—Literary Shoemakers—Imprisonment of the Learned—Singular Customs annually observed by the Company of Stationers—Book of Sports—Origin of Card;—Explanation of all the Letters on a Guinea.

ORIGIN OF THE WORD "NEWS."—The four cardinal points of the compass, marked with the letters N. E. W. S. standing for North, East, West, and South, form the word News, which coming from all parts of the world, gave derivation to the word.

ORIGIN OF NEWSPAPERS.—We are indebted to the Italians for the idea of Newspapers. The title of the *Gazzetas*, was perhaps derived from *Gazzera*, a magpie or chatterer; or more probably from a farthing coin, peculiar to the city of Venice, called *Gazetta*, which was the common price of the newspapers. Another learned etymologist is for deriving it from the Latin *Gaza*, which would colloquially lengthen into *Gazetta*, and signify a little treasury of news. The Spanish derive it indeed from the Latin *Gaza*; and likewise their *Gazatero*, and our *Gazetteer*, for a writer of the *Gazette*; and, what is peculiar to themselves, *Gazetista*, for a lover of the *Gazette*.

Newspapers then took their birth in that principal land of modern politicians, Italy, and under the government of that aristocratical republic, Venice. The first paper was a Venetian one, and only monthly: but it was the newspaper of the government only. Other governments afterwards adopted the Venetian name for it; and from one solitary government Gazette, we see what an inundation of newspapers has burst out upon us in this country.

Mr. Chalmers gives, in his life of Ruddiman, a curious particular of these Venetian Gazettes. "A jealous government did not allow a printed newspaper; and the Venetian *Gazetta* continued long after the invention of printing to the close of the sixteenth century, and even to our own days, to be distributed in manuscript." In the Magliabechian library at Florence are thirty volumes of Venetian *Gazzetas*, all in manuscript.

Those who first wrote newspapers, were called by the Italians *Menanti*, because, says Vossius, they intended commonly by

these loose papers to spread about defamatory reflections, and were therefore prohibited in Italy by Gregory XIII. in a particular bull, under the name of *Menantes*, from the Latin *Minantes*, threatening. *Menage*, however, derives it from the Italian *Menare*, which signifies, to lead at large, or spread afar.

Mr. Chalmers discovers in England the first newspaper. It may gratify national pride, says he, to be told, that mankind are indebted to the wisdom of Elizabeth and the prudence of Burleigh for the first newspaper. The epoch of the Spanish Armada is also the epoch of a genuine newspaper. In the British Museum are several newspapers which had been printed while the Spanish fleet was in the English Channel, during the year 1588. It was a wise policy to prevent, during a moment of general anxiety, the danger of false reports, by publishing real information. The earliest newspaper is entitled "The English Mercurie," which by authority "was imprinted at London by her highness's printer, 1588." These were, however, but extraordinary Gazettes, not regularly published.

The following are curious INSTANCES OF NEW STUDIES IN OLD AGE.—Socrates learnt to play on musical instruments in his old age; Cato, at eighty, thought proper to learn Greek; and Plutarch, almost as late in life, Latin.

Theophrastus began his admirable work on the characters of men, at the extreme age of ninety. He only terminated his literary labours by his death.

Peter Ronsard, one of the fathers of French poetry, applied himself late to study. His acute genius, and ardent application, rivalled those poetic models which he admired.

The great Arnauld retained the vigour of his genius, and the command of his pen, to his last day; and at the age of eighty-two was still the great Arnauld.

Sir Henry Spelman neglected the sciences in his youth, but cultivated them at fifty years of age, and produced good fruit. His early years were chiefly passed in farming, which greatly diverted him from his studies; but a remarkable disappointment respecting a contested estate, disgusted him with these rustic occupations, and resolving to attach himself to regular studies and literary society, he sold his farms, and became a most learned antiquary and lawyer.

Colbert, the famous French minister, almost at sixty returned to his Latin and law studies.

Tellier, the chancellor of France, learnt logic, merely for an amusement, to dispute with his grandchildren.

Dr. Johnson applied himself to the Dutch language but a few years before his death. But on this head the Marquis de Saint

Anlaire may be regarded as a prodigy: at the age of seventy he began to court the Muses, and they crowned him with their freshest flowers. His verses are full of fire, delicacy, and sweetness. Voltaire says, that Anacreon, less old, produced less charming compositions.

Chaucer's *Canterbury Tales* were the composition of his latest years: they were begun in his fifty-fourth year, and finished in his sixty-first: it is on these works his fame is established, at least they are those which are most adapted to attract all classes of poetical readers.

The celebrated Boccaccio was thirty-five years of age when he began his studies in polite literature. He has, however, excelled many whose whole life has been devoted to this branch of letters. Such is the privilege of genius.

Ludovico Monaldesco, at the extraordinary age of 115, wrote the memoirs of his time: a singular exertion, noticed by Voltaire, who himself is one of the most remarkable instances of the progress of age in new studies.

Koonhert began at forty to learn the Latin and Greek languages, of which he became a master; several students, who afterwards distinguished themselves, have commenced as late in life their literary pursuits. Ogilby, the translator of Homer and Virgil, knew little of Latin or Greek, till he was past fifty; and Franklin's philosophical pursuits began when he had nearly reached his fiftieth year.

Accorso, a great lawyer, being asked why he began the study of the law so late, answered, that indeed he began it late, but should therefore master it the sooner.

Dryden's complete works form the largest body of poetry from the pen of one writer in the English language; yet he gave no public testimony of poetical abilities till his twenty-seventh year. In his sixty-eighth year he proposed to translate the whole *Iliad*; his most pleasing productions were written in his old age.

Michael Angelo preserved his creative genius even in extreme old age; for he worked almost to his last day, and he reached his ninetieth year. He alludes, doubtless, to himself in an ingenious device, if it be of his own invention: A venerable old man is represented in a go-cart, an hour-glass upon it, with the inscription, *ANCORA IMPARO! YET I AM LEARNING!*

LITERARY SHOEMAKERS.—The fraternity of shoemakers have unquestionably given rise to some characters of worth and genius. The late Mr. Holcroft was originally a shoemaker. His dramatic pieces must rank among the best of those on the English stage. Robert Bloomfield wrote his poem of "*The Farmer's Boy*," while employed at this business,

and Dr. William Carey, professor of Sanscrit and Bengalee at the college of Fort William, Calcutta, and the able and indefatigable translator of the Scriptures into many of the Eastern languages, was in early life a shoemaker in Northamptonshire. The present Mr. Gifford, the translator of Juvenal, and the supposed editor of the Quarterly Review, spent some of his early days in learning the "craft and mystery" of a shoemaker; as he tells us, in one of the most interesting pieces of auto-biography ever penned, and prefixed to his nervous and elegant version of the great Roman satirist.

IMPRISONMENT OF THE LEARNED.—Imprisonment seems not much to have disturbed the men of letters in the progress of their studies.

It was in prison that Boethius composed his excellent book on the Consolations of Philosophy.

Grotius wrote, in his confinement, his Commentary on St. Matthew.

Buchanan, in his dungeon of a monastery in Portugal, composed his excellent Paraphrases on the Psalms of David.

Pelisson, during five years' confinement for some state affairs, pursued with ardour his studies in the Greek language, in philosophy, and particularly in theology, and produced several good compositions.

Michael Cervantes composed the best and most agreeable book in the Spanish language, during his captivity in Barbary.

Fleta, a well-known and very excellent little law production, was written by a person confined in the fleet prison for debt, but whose name has not been preserved.

Louis XII. when he was Duke of Orleans, being taken prisoner at the battle of St. Aubin, was long confined in the tower of Bourges, and applying himself to his studies, which he had hitherto neglected, he became, in consequence, an able and enlightened monarch.

Margaret, Queen of Henry IV. King of France, confined in the Louvre, pursued very warmly the study of elegant literature, and composed a very skilful apology for the irregularities of her conduct.

Charles I. during his cruel confinement at Holmsby, wrote that excellent book, entitled *The Portait of a King*, which he addressed to his son, and where the political reflections will be found not unworthy of Tacitus. This work, however, has been attributed, by his enemies, to a Dr. Gowden, who was incapable of writing a single paragraph of it.

Queen Elizabeth, while confined by her sister Mary, wrote some very charming poems, which we do not find she ever could equal after her enlargement: and Mary Queen of Scots,

during her long imprisonment by Elizabeth, produced many beautiful poetic compositions.

SINGULAR CUSTOM ANNUALLY OBSERVED BY THE COMPANY OF STATIONERS.—On the annual aquatic procession of the Lord Mayor of London to Westminster, the barge of the Company of Stationers, which is usually the first in the show, proceeds to Lambeth palace, where for time immemorial they have received a present of sixteen bottles of the Archbishop's prime wine. This custom originated at the beginning of the last century. When archbishop Tenison enjoyed the see, a very near relation of his, who happened to be master of the Stationers' Company, thought it a compliment to call there in full state, and in his barge: when the archbishop was informed that the number of the company within the barge was thirty-two, he thought that a pint of wine for each would not be disagreeable; and ordered, at the same time, that a sufficient quantity of new bread and old cheese, with plenty of strong ale, should be given to the watermen and attendants: and from that accidental circumstance it has grown into a settled custom. The Company, in return, presents to the Archbishop a copy of the several almanacks which they have the peculiar privilege of publishing.

BOOK OF SPORTS.—A book, or declaration, drawn up by bishop Morton, in the reign of king James I. to encourage recreations and sports on the Lord's day. It was to this effect: "That for his good people's recreation, his majesty's pleasure was, that, after the end of divine service, they should not be disturbed, letted, or discouraged, from any lawful recreations; such as dancing, either of men or women; archery for men; leaping, vaulting, or any such harmless recreations; nor having of may-games, whitsun-ales, or morrice-dances; or setting up of may-poles, or other sports therewith used, so as the same may be had in due and convenient time, without impediment or let of divine service; and that women should have leave to carry rushes to the church for the decorating of it, according to their old customs: withal prohibiting all unlawful games to be used on Sundays only; as bear-bating, bull-bating, interludes, and at all times (in the meaner sort of people prohibited) bowling." Two or three restraints were annexed to the declaration, which deserve notice:—1. No recusant (i. e. papist) was to have the benefit of this declaration. 2. Nor such as were not present at the whole of divine service. 3. Nor such as did not keep to their own parish churches, that is, puritans.

This declaration was ordered to be read in all the parishes of Lancashire, which abounded with papists; and Wilson adds,

that it was to have been read in all the churches of England, but that archbishop Abbot, being at Croydon, flatly forbade its being read there. In the reign of king Charles I. archbishop Laud put the king upon republishing this declaration, which was accordingly done. The court had their balls, masquerades, and plays, on the Sunday evenings; while the youth of the country were at their morrice-dances, may-games, church and clerk ales, and all such kind of revelling. The severe pressing of this declaration made sad havock among the puritans, as it was to be read in the churches. Many poor clergymen strained their consciences in submission to their superiors. Some, after publishing, immediately read the fourth commandment to the people:—"Remember the sabbath day, to keep it holy:" adding, "This is the law of God;" the other, "The injunction of man." Some put it upon their curates; whilst great numbers absolutely refused to comply: the consequence of which was, that several clergymen were actually suspended for not reading it.

ORIGIN OF CARDS.—About the year 1390, cards were invented, to divert Charles VI. then king of France, who was fallen into a melancholy disposition.

That they were not in use before, appears highly probable, 1st. Because no cards are to be seen in any paintings, sculpture, tapestry, &c. more ancient than the preceding period, but are represented in many works of ingenuity since that age.

2dly. No prohibitions relative to cards, by the king's edicts, are mentioned, although, some few years before, a most severe one was published, forbidding by name, all manner of sports and pastimes, in order that the subjects might exercise themselves in shooting with bows and arrows, and be in a condition to oppose the English. Now it is not to be presumed, that so luring a game as cards would have been omitted in the enumeration, had they been in use.

3dly. In all the ecclesiastical canons prior to the said time, there occurs no mention of cards; although, twenty years after that date, card-playing was interdicted by the clergy, by a Gallican synod. About the same time is found, in the account book of the king's cofferer, the following charge:—"Paid for a pack of painted leaves bought for the king's amusement, three livres." Printing and stamping being then not discovered, the cards were painted, which made them so dear. Thence, in the above synodical canons, they are called *gillæ pictæ*, painted little leaves.

4thly. About thirty years after this, came a severe edict against cards in France; and another by Emanuel, duke of Savoy; only permitting the ladies this pastime, *pro spinulis*, for pins and needles.

Of their design.—The inventor proposed, by the figures of the four suits, or colours, as the French call them, to represent the four states, or classes, of men in the kingdom.

By the *Cæsars* (Hearts) are meant the *gens de chœur*, choir men, or ecclesiastics; and therefore the Spaniards, who certainly received the use of cards from the French, have *copas*, or chalices, instead of hearts.

The nobility, or prime military part of the kingdom, are represented by the ends or points of lances or pikes; and our ignorance of the meaning or resemblance of the figure induced us to call them Spades. The Spaniards have *espases* (swords) in lieu of pikes, which is of similar import.

By Diamonds, are designed the order of citizens, merchants, and tradesmen, *carreaux* (square stone tiles or the like.) The Spaniards have a coin *dineros*, which answered to it; and the Dutch call the French word *carreaux stieneen*, stones and diamonds, from their form.

Treste, the trefoil leaf, or clover-grass (corruptly called Clubs) alludes to the husbandmen and peasants. How this suit came to be called clubs is not explained, unless, borrowing the game from the Spaniards, who have *bastos* (staves or clubs) instead of the trefoil, we gave the Spanish signification to the French figure.

The history of the four Kings, which the French in drollery sometimes call the cards, is *David*, *Alexander*, *Cæsar*, and *Charles*, (which names were then, and still are, on the French cards.) These respectable names represent the four celebrated monarchies of the Jews, Greeks, Romans, and Franks under Charlemagne.

By the Queens are intended *Argine*, *Esther*, *Judith*, and *Pallas*, (names retained in French cards,) typical of birth, piety, fortitude, and wisdom, the qualifications residing in each person. *Argine* is an anagram for *Regina*, queen by descent.

By the Knaves were designed the servants to knights (for knave originally meant only servant; and in an old translation of the Bible, St. Paul is called the knave of Christ) but French pages and valets, now indiscriminately used by various orders of persons, were formerly only allowed to persons of quality, esquires, (*escuiers*,) shield or armour-bearers.

Others fancy that the knights themselves were designed by those cards, because *Hogier* and *Lahire*, two names on the French cards, were famous knights at the time cards were supposed to be invented.

EXPLANATION OF ALL THE LETTERS ON A GUINEA.—The Inscription on a Guinea runs thus:—GEORGIUS III. DEI GRATIA, M. B. F. ET H. REX, F. D. B. ET L. D. S. R. I. A. T. ET E.

That is,—Georgius Tertius, Dei Gratia, Magnæ Britanniæ, Franciæ et Hiberniæ Rex, Fidei Defensor, Brunswicii et Lunenburgii Dux, Sacri Romani Imperii Archi-Thesaurarius et Elector.

In English,—George the Third, by the Grace of God, King of Great Britain, France, and Ireland, Defender of the Faith, Duke of Brunswick and Lunenburgh, Arch-Treasurer and Elector of the Holy Roman Empire



CHAP. LXXXII.

CURIOSITIES OF LITERATURE.—(Concluded)

Curious Address to the late Queen Charlotte—Quaint Lines on Queen Elizabeth—Curious Names adopted in the Civil Wars—Curious Extracts from the Will of an Earl of Pembroke—Curious Letter from Pomare, King of Otaheite, to the Missionary Society—Curious Love Letter and Answer—Creeds of the Jews—The Unbeliever's Creed—Explanation of the Terms "Whig" and "Tory."

CURIOS ADDRESS TO THE LATE QUEEN CHARLOTTE.

"The Address of the Burgomaster, Magistrates, and Citizens of Strelitz, to her Royal Highness the Most Illustrious Princess Sophia Charlotte, Duchess of Mecklenburgh, Princess of Wenden, Schrouin, and Pictzburgh, and Countess of Schwerin, and the countries of Rostock and Slan-gard, on her leaving the Territories of the said City in her Way to England, as the Royal Bride of his Most Illustrious Majesty George the Third, King of Great Britain, &c. &c. Aug. 27, 1761.

"Illustrious Dutchess, most gracious Princess and Lady; your Royal Highness is at present leaving that country whose happiness it has hitherto been to admire you, the model of a perfect Princess; you leave it to share with the greatest monarch in Europe, a throne respected through every part of the universe. The instant is at hand when your Royal Highness will for ever be withdrawn from our eyes: but it affects us the more sensibly, from the apprehension that the many great and brilliant objects, with which you will henceforth be connected, will efface so small a place as ours from your inestimable remembrance. Yet that goodness which we have hitherto with transport admired in your Royal Highness, revives our spirits; it assures us, that you will ever from the throne condescend graciously to look back on our town; and

continue the patroness of those whose happiness it is to be the subjects of your illustrious Family. We, therefore, in full confidence, give ourselves up to that lively joy excited in us all, on the glorious union to which the Divine Providence has called your Royal Highness, and beg leave to accompany you with our most cordial wishes for your safe journey and continual welfare and prosperity. May the Eternal Ruler of all things, who has appointed this great event, make your Royal Highness the most perfect instance of felicity, the delight of that Royal Family into which you are now entering, the joy of Britain, and the glory of the illustrious Mecklenburg! May our illustrious Sovereign, the beloved Adolphus Frederic, long, and in all earthly happiness, together with his faithful and happy subjects, rejoice in these felicities! Your Royal Highness will graciously permit that Twelve of our Daughters, here present in the attire of innocence, may, as a memorial of this fortunate event, second the ardent sentiments of their Fathers, and in artless words, most humbly wish you a safe and pleasant journey:—

Eleonora Dorothea Maria Bentghoven.

Hail Princess! with each shining virtue bright,
All pure within, without all glorious light,
Whose form divine, whose goodness we adore;
Heaven bless thy parting from the German shore!

Christiana Juliana Elizabeth Berendsden.

As Consort of a mighty Monarch shine,
Restore the honour of an ancient line;
For this thy coming, Britain's King invites,
For this he calls to Hymen's soft delights.

Dorothea Elizabeth Tetlington.

Thy soul with each divinest virtue fraught,
Thy wisdom perfect, both in word and thought;
Each British bosom shall with rapture fire,
And faction sleep whilst gazing crowds admire.

Sophia Elizabeth Gradhandlan.

When seated by thy royal Consort's side,
New lustre he shall gain from such a Bride;
Her worth shall grace the sacred nuptial ties,
And Britain's throne in dignity shall rise.

Carolina Henrietta Tangate.

O God! whose mercies through the world abound,
Whose power supports the King thy hand has crown'd,
Waft o'er the main the Bride's transcendent charms,
In safety to the Bridegroom's longing arms.

Dorothea Gaven.

May she, with each endearing art possess,
To pleasure ever soothe the Monarch's breast!
May all the royal virtues of her heart,
To faithful subjects joy sincere impart!

Anna Maria Elizabeth Christen.

Britons, rejoice, receive with loud acclaim
Sophia Charlotte, ever dear to fame;
Delight of Mecklenburg! she comes to shower
On Britain's isle new blessings every hour.

Madalen Elizabeth Colterjahn.

Thrice happy Bride! who soon shall cross the main,
Whom to behold again we wish in vain;
May happiness increasing with thee dwell,
To every age may fame thy glory tell!

Christiana Sophia Sealon.

From Ganges to where Mississippi flows,
Diffusing wealth and plenty as it goes;
From Senegal, still scorch'd by Phœbus' beams,
To where St. Lawrence rolls his silver streams,
Proclaim Britannia's bliss the world around,
From pole to pole, to earth's remotest bound.

Christiana Elizabeth Phoelen.

It's wish auspicious Flavel hastes to bring,
For fair Charlotta and his Britain's King;
On Britain's isle all blessing he implores,
And rolls his friendly wave to Albion's shores.

Dorothea Christiana Elizabeth Rexsehen.

Beneath the Lord's anointed may she thrive,
Still may his influence keep the palm alive,
Still may it flourish, branches still extend,
Afford us shelter, and from heat defend.

Catharine Sophia Bertrowen.

Nought can our brothers' ardent zeal restrain,
Fain would they tempt with thee the roaring main;
Permit them, Queen, thy person to be near,
That of thy safety tidings we may hear.

Chorus.

Yet for one favour more we must apply,
But little can these barren tracts supply;
Permit us, since both gold and pearls you scorn,
Your royal brows with myrtle to adorn!

QUAINT LINES ON QUEEN ELIZABETH.—Queen Elizabeth, who died at Greenwich, was brought thence to Whitehall by water, in a grand procession. On this occasion, as Camden informs us, the following quaint lines were written:—

“The Queen was brought by water to Whitehall;
At every stroke the oars did tears let fall;
More clung about the barge; fish under water
Wept out their eyes of pearl, and swam blind after.
I think the bargemen might, with easier thighs,
Have row’d her thither in her people’s eyes;
For howsoe’er, thus much my thoughts have scann’d,
She had come by water, had she come by land.”

CURIOUS NAMES ADOPTED IN THE CIVIL WARS.—A curious style of naming individuals was exceedingly common in the time of the civil wars. It was said that the genealogy of our Saviour might be learned from the names in Cromwell’s regiments. The muster-master used no other list than the first chapter of Matthew.

A Jury was returned in the county of Sussex of the following names:

Accepted Trevor, of Horsham.
Redeemed Compton, of Battle.
Faint-not Hewet, of Heathfield.
Make-peace Heaton, of Hare.
God-reward Smart, of Fivehurst.
Stand-fast-on-high Stringer, of Crowhurst
Earth Adams, of Warbleton.
Called Lower, of Warbleton.
Kill-sin Pimple, of Witham.
Return Spelman, of Watling.
Be-faithful Joiner, of Britling.
Fly-debate Robert, of Britling.
Fight-the-good-fight-of-faith White, of Emer.
More-fruit Fowler, of East Hadley.
Hope-for Bending, of East Hadley
Graceful Harding, of Lewes.
Weep-not Billings, of Lewes.
Meek Brewer, of Okeham.

A noted character in those days was a divine of the name of *Praise-God Barebone*. He is little known as a divine, but is celebrated for having been an active member in Cromwell’s parliament, and indeed for giving a name to it which is yet preserved in history. Praise-God Barebone had two brothers, namely, *Christ-came-into-the-world-to-save Barebone*, and *If-Christ-had-not-died-thou-hadst-been-damned Barebone*; some are said to have omitted the former part of the latter name, and to have called him only “Damned Barebone.”

The reader will be amused with the following **CURIOUS EXTRACTS FROM THE WILL OF AN EARL OF PEMBROKE.**

Imprimis.—For my soul; I confess I have heard very much of souls, but what they are, or whom they are, or what they are for, God knows, I know not: they tell me now of another world, where I never was, nor do I know one foot of the way thither. While the king stood, I was of his religion, made my son wear a cassock, and thought to make him a bishop, but then came the Scots, and made me a Presbyterian; and since Cromwell entered, I have been an Independent. These, I believe, are the kingdom's three estates; and if any of these can save a soul, I may claim one; therefore if my executors do find I have a soul, I give it to him who gave it me.

Item.—I give my body, for I cannot keep it, to be buried. Do not lay me in the church-porch, for I was a Lord, and would not be buried where Colonel Pride was born.

Item.—My will is, that I have no monument, for then I must have epitaphs and verses, and all my life long I have had too much of them.

Item.—I give all my deer to the Earl of Salisbury, who I know will preserve them, because he denied the king a buck out of one of his own parks.

Item.—I give nothing to the Lord Say; which legacy I give him, because I know he will bestow it on the poor.

Item.—To Tom May I give five shillings: I intended him more: but whoever has seen his history of the parliament, thinks five shillings too much.

Item.—I give Lieutenant General Cromwell one word of mine, because hitherto he never kept his own.

Item.—I give up the ghost, *concordat cum originati.*"

CURIOUS LETTER FROM POMARE, KING OF OTAHEITE, TO THE MISSIONARY SOCIETY.

(Translation.)

FRIENDS.

Matavae, Otaheite, Jan. 1, 1807.

I wish you every blessing, friends, in your residence in your country, with success in teaching this bad land, this foolish land, this wicked land, this land which is ignorant of good, this land that knoweth not the true God, this regardless land.

Friends, I wish you health and prosperity; may I also live, and may Jehovah save us all!

Friends, with respect to your letter you wrote to me, I have this to say to you, that your business with me, and your wishes, I fully consent to, and shall consequently banish Oré (his chief idol) and send him to Racatea.

Friends, I do therefore believe and shall obey your word.

Friends, I hope you also will consent to my request, which is this; I wish you to send a great number of men, women, and children, here.

Friends, send also property and cloth for us, and we also will adopt English customs.

Friends, send also plenty of muskets and powder, for wars are frequent in our country:—should I be killed, you will have nothing in Tahete; do not come here when I am dead. Tahete is a regardless country; and should I die with sickness, do not come here. This also I wish, that you would send me all the curious things that you have in England: also send me every thing necessary for writing; paper, ink, and pens, in abundance; let no writing utensil be wanting.

Friends, I have done, and have nothing at all more to ask you for: as for your desire to instruct Tahete, 'tis what I fully acquiesce in. 'Tis a common thing for people not to understand at first; but your object is good, and I fully consent to it; and shall cast off all evil customs.

What I say is truth, and no lie; it is the real truth.

This is all I have to write. I have done. Friends, write to me, that I may know what you have to say. I wish you life and every blessing. May I also live, and Jehovah save us all!

POMARE, King of Tahete, &c. &c.

*For my Friends, the Missionary
Society, London.*

CURIOUS LOVE LETTER.

Madam,—Most worthy of estimation! After long consideration, and much meditation, on the great reputation you possess in the nation, I have a strong inclination to become your relation. On your approbation of this declaration, I shall make preparation to remove my situation, to a more convenient station, to profess my admiration; and if such oblation is worthy of observation, and can obtain commiseration, it will be an aggrandization beyond all calculation of the joy and exultation,

Of your's,

SANS DISSIMULATION.

THE ANSWER.

Sir,—I perused your oration with much deliberation, and a little consternation, at the great infatuation of your imagination, to shew such veneration on so slight a foundation. But after examination and much serious contemplation, I supposed your animation was the fruit of recreation, or had sprung from ostentation, to display your education, by an odd enumeration, or rather multiplication, of words of the

same termination, though of great variation in each respective signification.

Now, without disputation, your laborious application in so tedious an occupation, deserves commemoration, and thinking imitation a sufficient gratification, I am, without hesitation,

Your's,

MARY MODERATION.

CREEDS OF THE JEWS.—The following piece is transcribed from the Common Prayer now in use among the Jews, and is entitled the Thirteen Creeds. It will give some idea of the theoretic branch of religion now prevailing among this singular people.

1. I believe, with a firm and perfect faith, that God is the Creator of all things; that he doth guide and support all creatures; that he alone has made every thing; and that he still acts, and will act, during the whole eternity.

2. I believe, with a firm and perfect faith, that God is one: there is no unity like his: he alone hath been, and shall be eternally, our God.

3. I believe, with a firm and perfect faith, that God is not corporeal; he cannot have any material properties; and no corporeal essence can be compared with him.

4. I believe, with a firm and perfect faith, that God is the beginning and end of all things.

5. I believe, with a firm and perfect faith, that God alone ought to be worshipped, and none but he ought to be adored.

6. I believe, with a firm and perfect faith, whatever hath been taught by the Prophets.

7. I believe, with a firm and perfect faith, that the doctrine of Moses is true. He is the father and the head of all the doctors that lived before or since, or shall live after him.

8. I believe, with a firm and perfect faith, that the law we have is the same as was given by Moses.

9. I believe, with a firm and perfect faith, that this law shall never be altered, and God will give no other.

10. I believe, with a firm and perfect faith, that God knoweth all the thoughts and actions of men.

11. I believe, with a firm and perfect faith, that God will reward the works of all those who perform his commandments, and punish those who transgress his laws.

12. I believe, with a firm and perfect faith, that the Messiah is to come. Although he tarrieth, I will wait, and expect daily his coming!

13. I believe, with a firm and perfect faith, the Resurrection of the Dead shall happen when God shall think fit. Blessed, and glorified eternally, be the name of the Creator! Amen.

THE UNBELIEVER'S CREED.

"I believe that there is no God, but that matter is God, and God is matter, and that it is no matter whether there is any God or not. I believe, also, that the world was not made; that the world made itself; that it had no beginning; that it will last for ever; world without end.

"I believe that a man is a beast, that the soul is the body, and the body is the soul; and that after death there is neither body nor soul.

"I believe there is no religion; that natural religion is the only religion; and that all religion is unnatural. I believe not in Moses; I believe in the first philosophy; I believe not in the Evangelists; I believe in Chubb, Collins, Toland, Tindal, Morgan, Mandeville, Woolston, Hobbes, and Shaftsbury; I believe in lord Bolingbroke; I believe not in St. Paul.

"I believe not in revelation; I believe in tradition; I believe in the Talmud; I believe in the Alcoran; I believe not in the Bible; I believe in Socrates; I believe in Confucius; I believe in Sanchoneathon; I believe in Mahomet; I believe not in Christ.

"Lastly, I believe in all unbelief."

EXPLANATION OF THE TERMS "WHIG" AND "TORY."—Burnet, who was contemporary with the introduction of these terms, gives the following account of the former:—

"The south-west counties of Scotland have seldom corn enough to serve them through the year; and the northern parts producing more than they need, those in the west come in the summer to buy at Leith, the stores that come from the north; and from a word (*whiggam*) used in driving their horses, all that drove were called *Whiggamors*, and, shorter, the *Whigs*. Now in that year, before the news came down of the duke of Hamilton's defeat, the ministers animated the people to rise and march to Edinburgh; and they came up, marching at the head of their parishes with an unheard-of fury, praying and preaching all the way as they came. This was called the *Whiggamor's* inroad; and ever after, all that opposed the court came in contempt to be called *Whigs*.

Dr. Johnson, in his Dictionary, quotes this passage; yet by placing against the term *Whig*, the Saxon word *Whæg*, synonymous to whey, or sour milk, he seems not to reject another derivation, which has been assigned to it by some writers.

Echard says—"Great animosities were created by these petitioners and abhorers, and they occasioned many feuds and quarrels in private conversations; and about the same time, 1680, and from the same cause, arose the pernicious terms and distinctions of *Whig* and *Tory*, both exotic names, which the parties invidiously bestowed upon each other. All

that adhered to the interest of the crown and lineal succession, were by the contrary branded with the title given to the Irish robbers; and they, in return, gave the others the appellation of Whig, or sour milk, formerly appropriated to the Scotch presbyterians and rigid covenanters.”—p. 988.

Tindal, in his introduction to the Continuation of Rapin's History, notices the distinction between the principles of the parties, but does not inquire into the etymology of the terms.—Vol. i. p. 15.

Toland, in his State Anatomy, considers the words as mere terms of reproach, first applied to each party by its enemies, and then adopted by each as a distinction.

“The words themselves are but late nicknames, given by each party to the other in King Charles the Second's reign: Tories in Ireland, and Whigs in Scotland, being what we in England call highwaymen; and you, public robbers.”—Part I.

Hume, the historian, says—

“This year, 1680, is remarkable for being the epoch of the well-known epithets Whig and Tory, by which, and sometimes without any material difference, this island has been so long divided. The court party reproached their antagonists with their affinity to the fanatical conventiclers, who were known by the name of Whigs; and the country party found a resemblance between the courtiers and the Popish banditti in Ireland, who were known by the name of Tories.”—Vol. VIII. p. 125.

These are the principal writers in which the origin of the terms is noticed.

CHAP. LXXXIII

MISCELLANEOUS CURIOSITIES.

*Monster—Individuation—Reproduction—Pelope—Centaur
and Lapithæ.*

MONSTER.—A birth or production of a living being, degenerating from the proper and usual disposition of parts in the species to which it belongs; as, when there are too many members, or too few; or some of them are extravagantly out of proportion, either on the side of defect or excess,—is generally denominated a monster.

F. Malebranche accounts for the production of monsters in the animal world in the following manner:—“The Creator has

established such a communication between the several parts of his creation, that we are naturally led to imitate one another, i. e. to have a disposition to do the same things, and assume the same manners, with those about which we converse; we have also certain natural dispositions, which incline us to compassion as well as imitation. Of these things most men are sensible, and therefore they need not be proved. The animal spirits, then, are not only naturally carried into the respective parts of the body to perform the same actions and the same motions which we see others do, but also to receive in some manner their wounds, and take part in their sufferings.

“Experience tells us, that when we look attentively on any person severely beaten, or that has a large wound, ulcer, or the like, the spirits immediately flow into those parts of our bodies which answer to those we see suffer in the other; unless their course be stopped from some other principle. This flux of spirits is very sensible in persons of delicate constitutions, who frequently shudder, and find a kind of trembling in the body on these occasions; and this sympathy in bodies produces compassion in the mind.

“Now it must be observed, that the view of a wound, &c. affects the person who views it the more strongly and sensibly, as the person is more weak and delicate; the spirits making a stronger impression on the fibres of a delicate body, than in those of a robust one. Thus, strong and vigorous men, &c. see an execution without much concern, while women, &c. are struck with pity and horror. As to children that are unborn, the fibres of their flesh being incomparably finer than those in women, the course of the animal spirits must necessarily produce much greater alterations.

“These things being laid down, monsters are easily accounted for. Suppose, for instance, a child to be born a fool, and also with its legs and arms broken in the same manner as those are of criminals executed; the phenomena may be accounted for thus: Every stroke given to the poor man struck forcibly the imagination of the mother, and, by a kind of counter-stroke, the tender and delicate brain of the child. Now, though the fibres of the woman’s brain were strongly shaken by the violent flux of animal spirits on this occasion, yet they had strength and consistence enough to prevent an entire disorder; whereas the fibres of the child’s brain, being unable to bear the shock of those spirits, were quite ruined, and the ravage was great enough to deprive him of reason all his lifetime.

“Again, the view of an execution frightening the mother, the violent course of the animal spirits was directed forcibly from the brain to all those parts of the body corresponding to the suffering parts of the criminal. and the same thing must

happen in the child. But as the bones were strong enough to resist the impulse of those spirits, they were not damaged; and yet the rapid course of these spirits could easily overpower and break the tender and delicate fibres of the bones of the child; the bones being the last parts of the body that are formed, and having a very slender consistence, while the child is yet in the womb."

To this it may here be added, that had the mother determined the course of these spirits towards some other part of her body, by tickling or scratching herself vehemently, the child would not in all probability have had its bones broken; but the part answering that to which the motion of the spirits was determined, would have been the sufferer. Hence appears the reason why women, in the time of gestation, seeing persons, &c. marked in such a manner in the face, impress the same mark on the same parts of the child; and why, upon rubbing some other part of the body when startled at the sight of any thing, or agitated with any extraordinary passion, the mark or impression is fixed on that hidden part, rather than on the face of the child. From the principles here laid down, most, if not all, of the phenomena of monsters, may be easily accounted for.

Various other theories have been formed by different philosophers and physiologists. But, after all, it must be confessed that we seem as yet to be very little acquainted with nature in her numerous variations.

Monsters are more common and more extraordinary in the vegetable than in the animal kingdom, because the different juices are more easily deranged and confounded together. Leaves are often seen, from the internal part of which other leaves spring forth; and it is not uncommon to see flowers of the ranunculus, from the middle of which issues a stalk bearing another flower. M. Bonnet informs us, that in certain warm and rainy years he has frequently met with monsters of this kind in rose-trees. This observer saw a rose, from the centre of which issued a square stalk of a whitish colour, tender, and without prickles, which at its top bore two flower-buds opposite to each other, and totally destitute of a calix; a little above the buds issued a petal of a very irregular shape. Upon the prickly stalk which supported the rose, a leaf was observed which had the shape of trefoil, together with a broad flat pedicle. In the *Memoirs of the Academy of Sciences*, for 1707, p. 448, mention is made of a rose, from the centre of the leaves of which issued a rose-branch two or three inches long, and furnished with leaves. See the same *Memoirs* for 1724, p. 20, and for 1749, p. 44. In the *Memoirs* for 1755, a very singular instance is mentioned of a monstrosity observed by M. Duhamel, in an apple-tree ingrafted with

clay. At the place of the insertion there appeared a bud, which produced a stalk and some leaves; the stalk and the pedicle of the leaves were of a pulpy substance, and had the most perfect resemblance both in taste and small to the pulp of a green apple.

An extraordinary *chamamelum* is mentioned in the *Acta Helvetica*. M. Bonnet, in his *Recherches sur l'Usage des Feuilles*, mentions likewise some monstrous productions which have been found in fruits with kernels, analogous in their nature to those which occur in the flowers of the ranunculus and of the rose-tree. He has seen a pear, from the eye of which issued a tuft of thirteen or fourteen leaves, very well shaped, and many of them of the natural size. He has seen another pear which gave rise to a ligneous and knotty stalk, on which grew another pear somewhat larger than the first. The stalk had probably flourished, and the fruit had formed. The *lilium album polyanthos*, observed some years ago at Breslaw, which bore on its top a bundle of flowers, consisting of one hundred and two lilies, all of the common shape, is well-known. M. Regnier has mentioned some individuals monstrous with respect to the flower, in the *Journal de Physique et d'Histoire Naturelle*, for November, 1785. He has likewise mentioned a monstrous tulip, which is seen in the gardens of some amateurs; juniper berries with horns; a balsamine with three spurs, &c.

INDIVIDUATION,—is the unity of a thing with itself, or that whereby a thing is what it is.

To begin with those species of body that are not properly organized, which have neither life nor sense, as stones, metals, &c. In these, individuation seems to consist in nothing but greater or less: take the less part of a stone away, you may still call it the same stone; take an equal part with the remains, that individuation ceases, and they are two new individuals. Divide a stone, &c. as often as you please, every part of it will be a stone still, another individual stone, as much as any in the mountain or quarry out of which it was first cut, even though reduced to the minutest sand, or, if possible, a thousand times less. But when we take one step farther, and proceed a degree higher, to the vegetable kingdom, the case is far otherwise; and indeed Nature seems to be still more distinct, and, as it were, careful in its individuation, the higher it rises, till at last it brings us to that great transcendental individual, the only proper uncompounded essence, the One God, blessed for ever.

To return to plants: their individuation consists in that singular form, contexture, and order of their parts, whereby they are disposed for those uses to which Nature has designed

them, and by which they receive and maintain their beings. For example, in a tree, though you take away the branches, it grows, receives nourishment from the earth, maintains itself, and is still a tree, which the parts thereof are not when separated from the rest; for we cannot say that every part of a tree is a tree, as we can that every part of a stone is still a stone, but if this tree be cloven in two or more pieces, or felled by the roots, this contexture, or orderly respect of the parts one to another, ceases; its essence as a tree is destroyed; its individuation perishes; and it is no more a tree, but a stump, or piece of timber.

Let us proceed a degree higher, to merely sensible creatures, who are not so immediately depending on the earth, the common mother, as the plants, nor rooted to it as they are, but walk about, and have a kind of independent existence, and are a sort of world by themselves. And here the individuation consists in such a particular contexture of their essential parts, and their relation one toward another, as enables them to exert the operations of the sensible or animal life. Thus, cut off the legs or any other parts of an animal, it is the same animal still; but cut off its head, or take away its life, and it is no longer that individual animal, but a mere carcase, and will, by degrees, resolve itself into common matter again.

To ascend now to the highest rank of visible beings,—the rational. The individuation of man appears to consist in the union of a rational soul with any convenient portion of fitly organized matter. Any portion of matter duly qualified, and united to the soul by such a union as we experience, is immediately individuated by it, and, together with that soul, makes a man; so that, if it were possible for one soul to be clothed over and over at different times with all the matter in the universe, it would in all those distinct shapes be the same individual man. Nor can a man be supposed in this case to differ more from himself, than he does from what he really was when an infant, or just passed an embryo, when compared with what he is when of adult or decrepit age; he having, during that intermediate time, changed his portion of matter over and over; as, being fat and lean, sick and well, having been exhausted by bleeding, effluvia, perspiration, &c.; and reunited again by aliment; so that perhaps not one particle, or but very few of the first matter which he took from his parents, and brought with him into the world, is now remaining.

The preceding article is naturally followed by **REPRODUCTION**.—Reproduction is usually understood to mean the restoration of a thing before existing, and since destroyed

It is very well known that trees and plants may be raised from slips and cuttings; and some late observations have shewn, that there are some animals which have nearly the same property. The polype (See *Hydra*) was the first instance we had of this kind; but we had scarcely time to wonder at the discovery M. Trembley had made, when M. Bonnet discovered the same property in a species of water-worm. Amongst the plants which may be raised from cuttings, there are some which seem to possess this quality in so eminent a degree, that the smallest portion of them will become a complete tree again. A twig of willow, poplar, or many other trees, being planted in the earth, takes root, and becomes a tree, every piece of which will in the same manner produce other trees. The case is the same with these worms: they are cut to pieces, and these several pieces become perfect animals; and each of these may be again cut into a number of pieces, each of which will in the same manner produce an animal. It has been supposed by some, that these worms were oviparous; but, M. Bonnet, on cutting one or them to pieces, having observed a slender substance, resembling a small filament, to move at the end of one of the pieces, separated it, and on examining it with glasses, found it to be a perfect worm, of the same form with its parent, which lived and grew larger in a vessel of water into which he put it. These small bodies are easily divided, and very readily complete themselves again, a day usually serving for the production of a head to the part that wants one; and, in general, the smaller and more slender the worms are, the sooner they complete themselves after this operation. When the bodies of the large worms are examined by the microscope, it is very easy to see the appearance of the young worms alive, and moving about within them; but it requires great precision and exactness to be certain of this, since the ramifications of the great artery have very much the appearance of young worms, and they are kept in a sort of continual motion by the systoles and diastoles of the several portions of the artery, which serve as so many hearts. It is very certain, that what we force in regard to these animals by our operations, is done also naturally every day in the brooks and ditches where they live. A curious observer will find in these places many of them without heads or tails, and some without either; as also, other fragments of various kinds, all of which are in the act of completing themselves; but whether accidents have reduced them to this state, or they thus purposely throw off parts of their own bodies for the production of more animals, it is not easy to determine. They are plainly liable to many accidents, by which they lose the several parts of their bodies; and they must perish very early, if they had not a power of

reproducing what was lost. They are often broken into two parts, by the resistance of some hard piece of mud which they enter; and they are subject to a disease, a kind of gangrene, rotting off the several parts of their bodies, by which they must inevitably perish, were they not possessed of this surprising property.

The reproduction of several parts of lobsters, crabs, &c. is one of the greatest curiosities in natural history. It seems, indeed, inconsistent with the modern philosophical system of generation, which supposes the animal to be wholly formed in the egg; that, in lieu of an organical part of an animal cut off, another should arise perfectly like it: the fact, however, is too well attested to be denied. The legs of lobsters, &c. consist each of five articulations; now, when any of the legs happen to break by any accident, as by walking, &c. which frequently occurs, the fracture is always found to be at the suture near the fourth articulation; and what they thus lose is exactly reproduced in some time afterwards; that is, a part of the leg shoots out, consisting of four articulations, the first whereof has two claws, as before; so that the loss is entirely repaired.

If the leg of a lobster be broken off by design at the fourth or fifth articulation, what is thus broken off is always reproduced, even after a second or third accident. But if the fracture be made in the first, second, or third articulation, the reproduction is not so certain. And it is very surprising, that if the fracture be made at these articulations, at the end of two or three days, all the other articulations are generally found broken off to the fourth, which, it is supposed, is done by the creature itself, to make the reproduction certain. The part reproduced, is not only perfectly similar in form to that retrenched, but also, in a certain space of time, it grows equal to it. The creature is, however, frequently taken before this is accomplished. Hence it is that we frequently see lobsters, which have their two large legs unequal in all proportions.

PERUKE.—It appears that this term was originally applied to describe a fine natural head of long hair, and if this appellation had been retained, we should never have associated wigs with monsters. But whatever may have been the ancient use or meaning of the word, it has now almost become obsolete, though it was for more than a century in constant application to those artificial heads of hair, made probably at first to conceal natural or accidental baldness, but which afterwards became so ridiculously fashionable, as to be worn in preference to the most beautiful locks, absurdly shaved off the head to make room for them.

Ancient authors might be quoted, to prove, that the great and luxurious of that time, had recourse to this mode of concealing defects, and of decorating the head; nay, it might perhaps be proved, that the peruke of the Emperor Commodus was more absurdly composed than any modern peruke has ever been; and indeed it must be admitted, that a wig powdered with scrapings of gold, in addition to oils and glutinous perfumes, must have made a more wonderful appearance than our immediate ancestors ever witnessed. It was in the reign of our Charles the First, that perukes were introduced throughout Europe, when the moralists attacked them without mercy, as they perceived that the folly of youth even extended to the cutting off nature's locks, to be replaced by the hair of the dead, and of horses, woven into a filthy piece of canvass. Admonition and ridicule were, however, of little avail, and the clergy began to be affected by the general mania. Those on the Continent being almost universally Roman Catholics, were so completely subject to their superiors, that the peruke was soon routed from their body; but as the dignified clergy of England conceive that their consequence is increased by the enormous bushes of hair upon their heads, and the judges have adopted their sentiments in this particular, it is probable many years will elapse before the shape and absurdity of two particular species of perukes are forgotten.

About the close of the seventeenth century, the peruke was made to represent the natural curl of the hair, but in such profusion, that ten heads would not have furnished an equal quantity, as it flowed down the back, and hung over the shoulders half way down the arms. By 1721, it had become fashionable to tie one half of it on the left side into a club. Between 1730 and 1740, the bag-wig came into fashion, and the peruke was docked considerably, and sometimes plaited behind into a queue, though even till 1752 the long flowing locks maintained their influence. After 1770 those were rarely seen; and since that time persons wearing perukes have generally had substantial reasons for so doing, from baldness, and complaints in the head. At one time, indeed, when the stern virtues of Brutus were much in vogue, the young men of Europe wore perukes of black or dark hair, dressed from his statues. Many particulars on this subject have been preserved by Mr. Malcolm, in his "Anecdotes of the Manners and Customs of London," from which we learn, that a young countrywoman obtained £60 for her head of hair in the year 1700, when human hair sold at £3 per ounce; and in 1720, the grey locks of an aged woman sold for £50 after her decease. Wigs of peculiar excellence were sold at £40 each.

A petition from the master peruke-makers of London and Westminster, presented to the King, in 1763, points out the great decline of their use to have taken place at that time. In this they complain of the public wearing their own hair; and say, "That this mode, pernicious enough in itself to their trade, is rendered excessively more so by swarms of French hair-dressers already in those cities, and daily increasing."

We close this chapter with an account of CENTAURS AND LAPITHÆ.—Under the reign of Ixion, king of Thessaly, a company of bulls which fed upon Pelion ran mad, by which means the mountain was inaccessible. They also descended into the inhabited parts, ruining the trees and fruits, and killing the larger cattle. Upon which Ixion declared that he would give a great reward to any person that would destroy these bulls. Riding on horseback was never practised before that time. But some young men that lived in a village at the foot of Pelion, had attempted successfully to train horses fit to back, and had accustomed themselves to that exercise. These youths undertook to clear the mountain of the bulls, which they effected by pursuing them on horseback, and piercing them with their arrows as they fled; but when the bulls stopped or followed them, they retired without receiving any hurt. And from hence they were called Centaurs, viz. Pierce bulls. Having received of Ixion the recompense he promised them, they became so fierce and proud, that they committed a thousand insolences in Thessaly, not sparing even Ixion himself, who dwelt in the town of Larissa. The inhabitants of the country were at that time called Lapithæ, who one day invited the Centaurs to a feast which they celebrated: but the Centaurs abused their civility; for, having drunk too much, they took the Lapithites' women from them, set them on their horses, and carried them away. This violence kindled a long war between the Centaurs and the Lapithæ: the Centaurs in the night came down into the plain, and laid ambushes for their enemies, and, as soon as day appeared, retired again into the mountain, with whatever they had taken. Thus, as they retired, the Lapithæ saw only the hinder parts of their horses, and the men's heads; so that they seemed but as one animal, whence they believed the Centaurs had become half men and half horses, and that they were clouds, because the village where they dwelt was called Nophelus, which signified a cloud.

MISCELLANEOUS CURIOSITIES.—(Continued.)

Spontaneous Inflammation—Diseases peculiar to Particular Countries—Injuries from Swallowing the Stones of Fruits—Extraordinary Surgical Operation—Extraordinary Cures by Burning—Illumination by Electricity—Divisibility of Matter.

SPONTANEOUS INFLAMMATION.—A paper on this subject, which appeared in the *Repertory of Arts*, vol. ii. p. 425, induced the Rev. W. Tooke to publish some remarks in vol. iii. p. 95, of that work, from which the following is an extract, respecting the spontaneous inflammation of animal and vegetable substances. “One Rüde, (says he,) an apothecary at Bautzen, had prepared a pyrophorus from rye-bran and alum. Not long after he had made the discovery, there broke out, in the next village of Nauslitz, a great fire, which did much mischief, and was said to have been occasioned by the treating of a sick cow in the cow-house. Mr. Rüde knew that the countrymen were accustomed to lay an application of parched rye-bran to their cattle, for curing the thick neck; he knew also that alum and rye-bran, by a proper process, yielded a *pyrophorus*; and now, to try whether parched rye-bran alone would have the same effect, he roasted a quantity of it by the fire, till it had acquired the colour of roasted coffee. This roasted bran he wrapped up in a linen cloth; in a few minutes there arose a strong smoke, with a smell of burning. Soon after, the rag grew as black as tinder, and the bran, now become hot, fell through it on the ground in little balls. Mr. Rüde repeated the experiment, and always with the same result. Who now will doubt, that the frequency of fires in cow-houses, which in those parts are mostly wooden buildings, is occasioned by this practice, of binding roasted bran about the necks of the cattle?”

Montet relates, in the *Mémoires de l'Académie de Paris*, 1748, that animal substances kindle into flame; and that he himself has been witness to the spontaneous accension of dung-hills. The woollen stuff prepared at Sevéennes, named Emperor's stuff, has kindled of itself, and burnt to a coal. It is usual for this to happen to woollen stuffs, when in hot summers they are laid in a heap, in a room but little aired. In June, 1781, this happened at a woolcomber's in Germany, where a heap of wool-combings, piled up in a close warehouse seldom aired, took fire of itself. This wool burnt from within outwards, and became quite a coal; though neither

fire nor light had been used at the packing. In like manner cloth-workers have certified, that after they have bought wool that was become wet, and packed it close in their warehouse, this wool has burnt of itself. The spontaneous accension of various matters from the vegetable kingdom, as wet hay, corn, and madder, and at times wet meal and malt, is well known. Hemp, flax, and hemp-oil, have also often given rise to dreadful conflagrations.

In the spring of 1780, a fire was discovered on board a frigate lying in the roads off Cronstadt, which endangered the whole fleet. After the severest scrutiny, no cause of the fire was to be found; and the matter remained without explanation, but with strong surmises of some wicked incendiary.—In August, 1780, a fire broke out at the hemp magazine at St. Petersburg, by which several hundred thousand poods (about 36lb. English) of hemp and flax were consumed. The walls of the magazine are of brick, the floors of stone, and the rafters and covering of iron; it stands alone on an island in the Neva, on which, as well as on board the ships lying in the Neva, no fire is permitted.—In St. Petersburg, in the same year, a fire was discovered in the vaulted shop of a furrier. In these shops, which are all vaults, neither fire nor candle is allowed, and the doors of them are all of iron. At length the probable cause was found to be, that the furrier, the evening before the fire, had got a roll of new cerecloth, and had left it in his vault, where it was found almost consumed.—In the night between the 20th and 21st of April, 1781, a fire was seen on board the frigate Maria, at anchor, with several other ships, in the roads off the island of Cronstadt; the fire was, however, soon extinguished, but, by the severest examination, nothing could be extorted concerning the manner in which it had arisen. The garrison was threatened with a scrutiny that should cost them dear; and while they were in this cruel suspense, the wisdom of the sovereign gave a turn to the affair, which quieted the minds of all, by pointing out the proper method to be pursued by the commissioners of inquiry, in the following order to Czernichef: “When we perceived, by the report you have delivered in of the examination into the accident that happened on board the frigate Maria, that, in the cabin where the fire broke out, there were found parcels of matting, tied together with packthread, in which the soot of burnt fir-wood had been mixed with oil, for the purpose of painting the ship’s bottom, it came into our mind, that, for the fire which happened last year at the hemp-warehouses, the following cause was assigned; that the fire might have proceeded from the hemp being bound up in greasy mats, or even from such mats having lain near the hemp: therefore, neglect not to guide your farther inquiries by this remark.”

As, upon juridical examination as well as private inquiry, it was found that, in the ship's cabin, where the smoke appeared, there lay a bundle of matting, containing Russian lamp-black, prepared from fir-soot moistened with hemp-oil varnish, which was perceived to have sparks of fire in it at the time of the extinction, the Russian admiralty gave orders to make various experiments, to see whether a mixture of hemp-oil varnish and the forementioned Russian black, folded up in a mat and bound together, would kindle of itself. They shook 40lb. of fir-wood soot into a tub, and poured about 35lb. of hemp-oil varnish upon it; this they let stand for an hour, after which they poured off the oil. The remaining mixture they now wrapped up in a mat, and the bundle was laid close to the cabin where the midshipmen had their birth. Two officers sealed both the mat and door with their own seals, and stationed a watch of four officers, to take notice of all that passed during the whole night; and as soon as any smoke should appear, immediately to give information to the commandant of the port. The experiment was made on the 26th of April, about eleven o'clock A. M. in presence of all the officers. Early on the 27th, about six o'clock A. M. a smoke appeared, of which the chief commandant was immediately informed: he came with speed, and, through a small hole in the door, saw the mat smoking. He dispatched a messenger to the members of the commission; but as the smoke became stronger, and fire began to appear, he found it necessary to break the seals and open the door. No sooner was the air thus admitted, than the mat began to burn with greater force, and presently it burst into a flame.

The Russian admiralty, being now fully convinced of the self-enkindling property of this composition, transmitted their experiment to the Imperial Academy of Sciences; who appointed Mr. Georgi, a very learned adjunct of the academy, to make farther experiments on the subject. Three pounds of Russian fir-black were slowly impregnated with 5lb. of hemp-oil varnish; and when the mixture had stood open five hours, it was bound up in linen. By this process it became clotted; but some of the black remained dry. When the bundle had lain sixteen hours in a chest, it was observed to emit a very nauseous, and rather putrid smell, not unlike that of boiling oil. Some parts of it became warm, and steamed much; eighteen hours after the mixture was wrapt up, one place became brown, emitted smoke, and directly afterwards glowing fire appeared. The same thing happened in a second or third place; though other places were scarcely warm. The fire crept slowly around, and gave a thick, grey, stinking smoke. Mr. Georgi took the bundle out of the chest, and laid it on a stone pavement; when, on being exposed to the

free air, there arose a slow burning flame, a span high, with a strong body of smoke. Not long afterwards, there appeared, here and there, several chaps, or clefts, as from a little volcano, the vapour issuing from which burst into flames. On his breaking the lump, it burst into a very violent flame, full three feet high, which soon grew less, and then went out. The smoking and glowing fire lasted six hours; and the remainder continued to glow without for two hours longer. The grey earthy ashes, when cold, weighed five and a half ounces. Mr. Tooke concludes with a case of self-accension, noticed by Mr. Hagemann, an apothecary, at Bremen. He prepared a boiled oil of *hyoscyamus*, or henbane, in the usual way, with common oil. The humidity of the herb was nearly evaporated, when he was called away by other affairs, and was obliged to leave the oil on the fire. The evaporation of the humidity was hereby carried so far, that the herb could easily be rubbed to powder. The oil had lost its green colour, and had become brownish. In this state it was laid on the straining cloth, and placed in the garden, behind the house, in the open air. In half an hour, on coming again to this place, he perceived a strong smoke there, though he thought the oil must have long been cooled: on closer inspection, he found that the smoke did not proceed from the oil, but from the herb on the straining cloth; at the same time the smell betrayed a concealed fire. He stirred the herb about, and blew into it with a bellows, whereupon it broke out into a bright flame.

DISEASES PECULIAR TO PARTICULAR COUNTRIES.—The inhabitants of particular places are peculiarly subject to particular diseases, owing to their manner of living, or to the air and effluvia of the earth and waters. Hoffman has made some curious observations on diseases of this kind. He remarks, that swellings of the throat have always been common to the inhabitants of mountainous countries: and the old Roman authors say, ‘Who wonders at a swelled throat in the Alps?’ The people of Switzerland, Carinthia, Stiria, the Hartz forest, Transylvania, and the inhabitants of Cronstadt, he observes, are all subject to this disease. The French are peculiarly troubled with fevers, worms, hydroceles, and sarcoceles; and all these disorders seem to be owing originally to their eating very large quantities of chestnuts. The people of Britain are affected with hoarsenesses, catarrhs, coughs, dysenteries, consumptions, and the scurvy; the women with the *fluor albus*; and children with a disease scarcely known elsewhere, which we call the rickets.

In different parts of Italy, different diseases reign. At Naples, the venereal disease is more common than in any other part

of the world. At Venice, people are peculiarly subject to the bleeding piles. At Rome, tertian agues and lethargic distempers are most common; in Tuscany, the epilepsy; and in Apulia, burning fevers, pleurisies, and that sort of madness which is attributed to the bite of the tarantula, and fancied to be cured by music. In Spain, apoplexies are common, as also melancholy, hypochondriacal complaints, and bleeding piles. The Dutch are peculiarly subject to the scurvy, and to the stone in the kidneys. The people of Denmark, Norway, Sweden, Pomerania, and Livonia, are all terribly afflicted with the scurvy: and it is remarkable, that in Denmark, Sweden, and Norway, fevers are very common; but in Iceland, Lapland, and Finland, there is scarcely ever such a disease met with. The Russians and Tartars are afflicted with ulcers, made by the cold, of the nature of what we call chilblains, but greatly worse; and in Poland and Lithuania, there reigns a peculiar disease, called the *Plica Polonica*, so terribly painful and offensive, that scarcely any thing can be thought worse. The people of Hungary are very subject to the gout and rheumatism: they are also more infested with lice and fleas than any other people in the world; and they have a peculiar disease which they call *cremor*. The Germans, in different parts of the empire, are subject to different reigning diseases. In Westphalia, they are peculiarly troubled with peripneumonies and the itch. In Silesia, Franconia, Austria, and other places thereabout, they are very liable to fevers of the burning kind, to bleedings at the nose, and other hæmorrhages; and to the gout, inflammations, and consumptions. In Misnia they have purple fevers; and the children are peculiarly infested with worms. In Greece, Macedonia, and Thrace, there are very few diseases; but what they have are principally burning fevers and phrenzies. Anciently, the most common diseases in Egypt were blindness, ulcers in the legs, consumptions, and the leprosy, called *elephantiasis*, which was peculiar to that country; as Pliny observes, *Egypti peculiare hoc malum elephantiasis*. At Constantinople the plague always rages; and in the West Indian islands, malignant fevers, and the most terrible colics. These diseases are called *endemic*. In general, it is observed, that the colder the country is, the fewer and the less violent are the diseases.

Schœffer tells us, that the Laplanders know no such thing as the plague, or fevers of the burning kind; nor are they subject to half the distempers we are. They are robust and strong, and live to eighty, ninety, and many of them to more than one hundred years; and at this great age they are not feeble and decrepit, but a man of ninety is able to work or travel as well as a man of sixty with us. They are subject, however, to some diseases, more than other nations. They

have often distempers of the eyes, owing to their living in smoke, or being blinded by snow. Pleurisies, inflammations of the lungs, and violent pains of the head, are also very frequently found among these hardy inhabitants of the north; and the small-pox rages with great violence. They have one general remedy against these and all other internal diseases; this is, the root of that sort of moss which they call *jerth*. They make a decoction of this root in the whey of rein-deer's milk, and drink very large doses of it warm, to keep up a breathing sweat; if they cannot get this, they use the stalks of angelica boiled in the same manner: but the keeping in a sweat, and drinking plentifully of diluting liquors, may go a great way in the cure. They cure pleurisies by this method in a very few days, and get so well through the small-pox with it, that very few die of the disease.

INJURIES FROM SWALLOWING THE STONES OF FRUITS.—

The dangers arising from swallowing the stones of plums and other fruits are very great. The Philosophical Transactions give an account of a woman who suffered violent pains in her bowels for thirty years, the malady returning once in a month or less. At length, a strong purge being given her, the occasion of all these complaints was discovered to be a stone of an oval figure, of about ten drams in weight, and measuring five inches in circumference. This had caused all the violent fits of pain, which she had suffered for so many years; after this, she became perfectly well. The ball extracted looked like a stone, and felt very hard, but swam in water. On cutting it through with a knife, there was found in the centre, a plum-stone, round which several coats of this hard and tough matter had gathered.

Another instance is given in the same papers, of a man, who, dying of an incurable colic, which had tormented him many years, and baffled the effects of medicines, was opened after death; and in his bowels was found a ball similar to that above-mentioned, but somewhat larger, being six inches in circumference, and weighing an ounce and a half. In the centre of this, as of the other, there was found the stone of a common plum, and the coats were of the same nature with those of the former. These and similar instances mentioned in the same work, sufficiently shew the folly of that common opinion, that the stones of fruits are wholesome. Even cherry stones, swallowed in great quantities, have occasioned death.

EXTRAORDINARY SURGICAL OPERATION.—"The most surprising and honourable operation of surgery ever performed, was, without any contradiction, that executed by M. Richerand,

by taking away a part of the ribs and of the pleura. The patient was himself a medical man, and not ignorant of the danger he ran in this operation being had recourse to; but he also knew that his disorder was otherwise incurable. He was attacked with a cancer on the internal surface of the ribs and of the pleura, which continually produced enormous fungosities, that had been in vain attempted to be repressed by the actual cautery. M. Richerand was obliged to lay the ribs bare, to saw away two, to detach them from the pleura, and to cut away all the cancerous part of that membrane.

"As soon as he had made the opening, the air rushing into the chest, occasioned the first day great suffering, and distressing shortness of breath; the surgeon could touch and see the heart through the pericardium, which was as transparent as glass, and could assure himself of the total insensibility of both. Much serous fluid flowed from the wound, as long as it remained open; but it filled up slowly by means of the adhesion of the lung with the pericardium, and the fleshy granulations that were formed in it. At length the patient got so well, that on the twenty-seventh day after the operation, he could not resist the desire of going to the Medicinal School, to see the fragments of the ribs that had been taken from him; and in three or four days afterwards he returned home, and went about his ordinary business. The success of M. Richerand is the more important, because it will authorize, in other cases, enterprises, which, according to received opinions, would appear impossible; and we shall be less afraid of penetrating into the interior of the chest. M. Richerand even hopes, that by opening the pericardium itself, and using proper injections, we may cure a disease that has hitherto always been fatal, the dropsy of that cavity."—*Thomson's Annals*.

EXTRAORDINARY CURES BY BURNING.—The following case is recorded in the memoirs of the Academy of Sciences, by M. Homberg. A woman, of about thirty-five, became subject to a headache, which at times was so violent, that it drove her out of her senses, making her sometimes stupid and foolish, at other times raving and furious. The seat of the pain was in the forehead, and over the eyes, which were inflamed, and looked exceedingly red and sparkling; and the most violent fits of it were attended with nausea and vomiting. In the time of the fits, she could take no food; but at all others she had a very good appetite. M. Homberg had in vain attempted her cure for three years, with all kinds of medicines: only opium succeeded; and that but little, all its effect being only to take off the pain for a few hours. The redness of her eyes was always the sign of an approaching

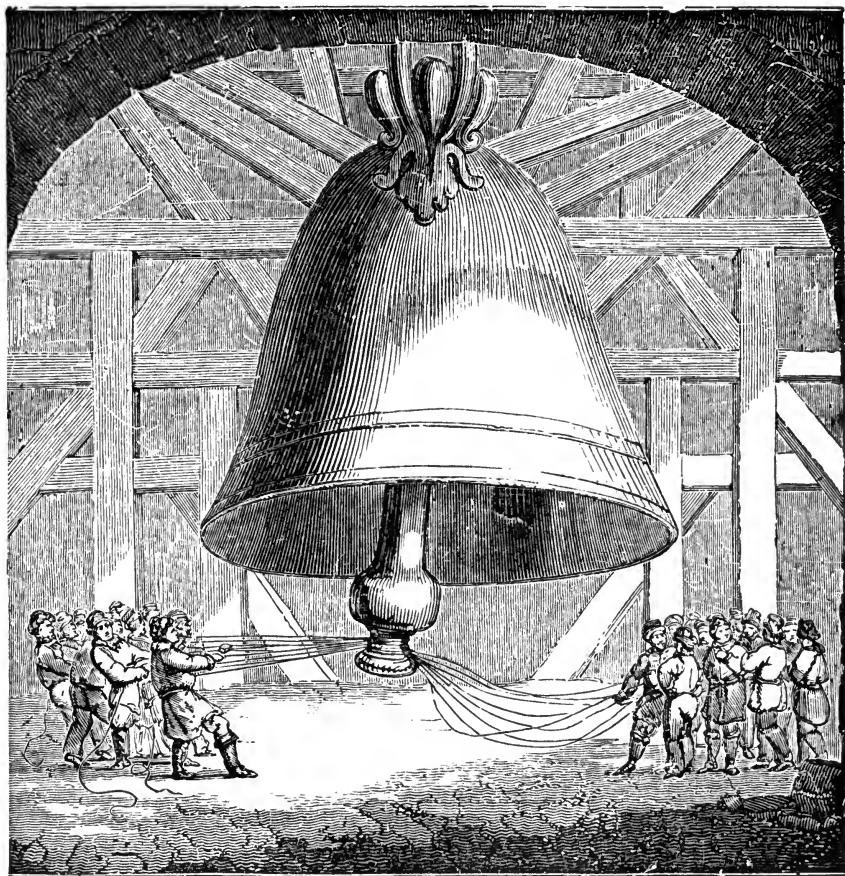
fit. One night, feeling a fit coming on, she went to lie down upon the bed; but first walked up to the glass with the candle in her hand, to see how her eyes looked: in observing this, the candle set fire to her cap; and as she was alone, her head was terribly burnt before the fire could be extinguished. M. Homberg was sent for, and ordered bleeding and proper dressings: but the expected fit this night never came on; the pain of the burning wore off by degrees; and the patient found herself from that hour cured of the headach, which had never once returned in four years after; such being the time when the account was communicated.

Another case, not less remarkable, was communicated to Homberg by a physician at Bruges. A woman, who for several years had her legs and thighs swelled in an extraordinary manner, found some relief from rubbing them before the fire with brandy every morning and evening. One evening, the brandy she had rubbed herself with took fire, and slightly burnt her. She applied some brandy to her burn; and in the night all the water with which the afflicted parts were swelled, was entirely discharged, and the swelling did not again return.

ILLUMINATION BY ELECTRICITY.—Professor Meinecke, of Halle, in Gilbert's Annals, 1819, Number 5, proposed to illuminate halls, houses, and streets, by the electric spark; and expresses his strong persuasion that one day it will afford a more perfect and less expensive light than gas-illumination, and ultimately replace it. His plan is, to arrange, what are called, in electricity, luminous tubes, glasses, &c.; i. e. insulating substances, having a series of metallic spangles at small distances from each other, along the place to be illuminated; and then, by a machine, send a current of electricity through them: sometimes also partially exhausted glasses, as the luminous receiver, conductor, &c., are used. In this way Professor Meinecke obtained from a two-foot plate machine, a constant light in his apartment equal to that of the moon, and even surpassing it; and by enclosing his system of sparks in tubes filled with rarified hydrogen gas, in which gas it is assumed that the electric spark is more than doubled in brilliancy, he thinks it will be easy to enlarge the plan to any extent.

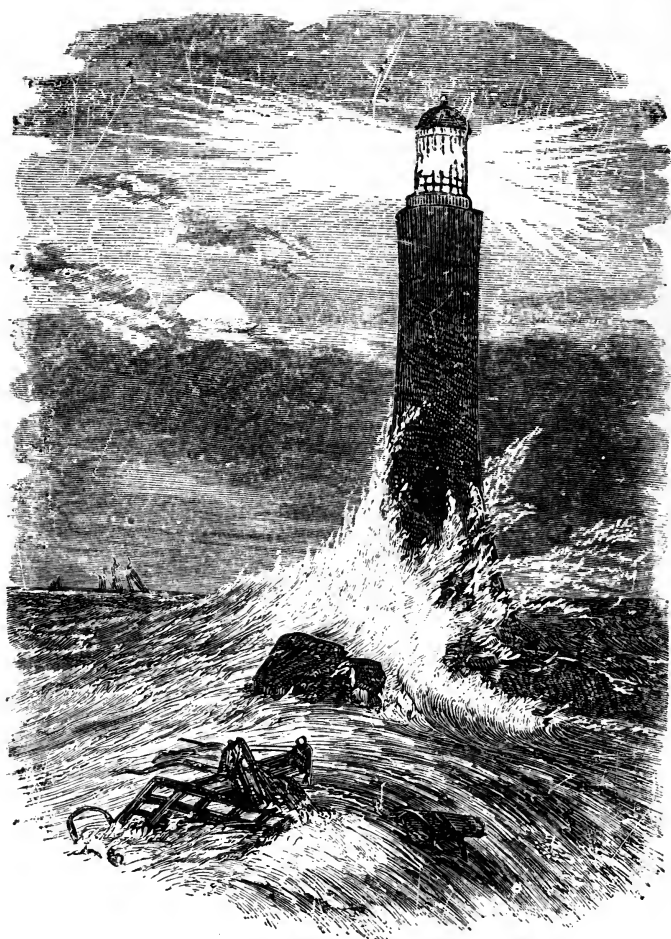
DIVISIBILITY OF MATTER.—We may be readily convinced of the infinite divisibility of bodies, by simply walking in a garden, and inhaling the sweet incense that rises from a thousand flowers. How inconceivably small must be the odoriferous particles of a carnation, which diffuse themselves through a whole garden, and every where strike our sense of

smell. If this is not sufficient, let us consider some other objects of nature; as, for instance, one of those silk threads, the work of a poor worm. Suppose this thread is three hundred and sixty feet long, it will weigh but a single grain. Again, consider into how many perceptible parts a length of three hundred and sixty feet can be divided. A single inch may be divided into six hundred parts, each as thick as a hair, and consequently be perfectly visible. Hence a single grain of silk can be divided into at least two millions five hundred and ninety-two thousand parts, each of which may be seen without the help of a microscope. And as every one of these parts may be again divided into several more millions of parts, till the division is carried beyond the reach of thought, it is evident that this progression may be infinite. The last particles, which are no longer divisible by human industry, must still have extension, and be consequently susceptible of division, though we are no longer able to effect it. If we examine the animal kingdom, we shall discover still further proofs of the infinite divisibility of matter. Pepper has been put into a glass of water, and on looking through a microscope, a multitude of animalcules were seen in the water, a thousand million times less than a grain of sand! How inconceivably minute then must be the feet, muscles, vessels, nerves, and organs of sense, in these animals! And how small their eggs and their young ones, and the fluids which circulate in them! Here the imagination loses itself, our ideas become confused, and we are incapable of giving form to such very small particles. What still more claims our attention is, that the more we magnify, by means of glasses, the productions of nature, the more perfect and beautiful do they appear: whilst with works of art it is generally quite contrary; for when these are seen through a microscope, we find them rough, coarse, and imperfect, though executed by the most able artists, and with the utmost care. Thus the Almighty has impressed even upon the smallest atom the stamp of his infinity. The most subtile body is as a world, in which millions of parts unite and are arranged in the most perfect order.



THE GREAT BELL OF MOSCOW,

THE largest bell in the world, is called in Russia the "Tzar Kolokol," or king of bells; from the metal of which at least thirty-six bells might be cast, each as large as the great bell of St. Paul's, which has been itself called an "enormous mass of metal." The "King of Bells" weighs 400,000 pounds, or nearly 200 tons; is 20 feet high, and 20½ in diameter. This enormous bell is now lying in a cavity close by Ivan Velikii, or Great Ivan, which is a tower belonging to the cathedral at Moscow. The tongue, which is 14 feet long, and 6 at its greatest circumference, lies exposed at the foot of the tower; it weighs as much as some of our largest bells. Russian authors state the bell to weigh 12,000 poods, or 432,000 pounds. Much metal was brought by persons from all parts of Russia, and thrown into furnaces while the bell was preparing; and the nobles vied with each other in casting in gold and silver plate, rings, trinkets, and ornaments of all kinds during the operation.



EDDYSTONE LIGHTHOUSE.

CHAP. LXXXV.

MISCELLANEOUS CURIOSITIES.—(Continued.)

The Jew's Harp—Remarkable Aqueducts—Crichup Linn—Eddystone Rocks—Dismal Swamp—Curious Wine Cellar—Mint of Segovia—Remarkable Mills—Silk Mill at Derby—Portland Vase—Murdering Statue—A Curious Pulpit.

THE JEW'S HARP.—The Jew's trump, or Jew's harp, as it is often called, though now a boy's instrument, is of ancient origin, for Mr. Pennant informs us, (*Tour to Scotland*, p. 195,) that one made of gilt brass was found in Norway, deposited in an urn. There appears to be an allusion, in the name, to the inhabitants of Judea; and it is to be observed, that in Dodsley's old plays, vol. iv. p. 171, Quick calls the usurer, on account of his Jewish avarice, "a notable Jew's trump." In the plate, however, of Jewish musical instruments, in Calmet's Dictionary, nothing of this kind occurs; so that perhaps there is a corruption here of *jeu-trompe*, a plaything, or play-tromp, as it is now only used by boys for that purpose; or it may be a corruption of Jew's harp, from the circumstance of its being placed between the teeth when played.

REMARKABLE AQUEDUCTS.—Aqueducts are conveyances for carrying water from one place to another; made on uneven ground, to preserve the level. Aqueducts of every kind were long ago the wonders of Rome; the vast quantity of them which they had; the prodigious expense employed in conducting waters over arcades from one place to another, at the distance of thirty, forty, sixty, and even one hundred miles, which were either continued or supplied by other labours, as by cutting mountains and piercing rocks: all this may well surprise us, as nothing like it is undertaken in our times; we dare not purchase conveniency at so dear a rate. Appius Claudius, the censor, devised and constructed the first aqueduct. His example gave the public luxury a hint to cultivate these objects; and the force of prodigious and indefatigable labour diverted the course of rivers and floods to Rome. Agrippa, in that year when he was edile, put the last hand to the magnificence of these works.

The aqueduct of the Aqua Martia, had an arch of sixteen feet in diameter. The whole was composed of three different kinds of stone; one of them reddish, another brown, and a third of an earth colour. Above, there appeared two canals, of which the highest was fed by the new waters of the Tive

rone, and the lower by what they called the Claudian river. The entire edifice is seventy Roman feet high. Near this aqueduct, we have, in Father Montfaucon, the plan of another, with three canals; the highest supplied by the Aqua Julia, that in the middle from Tepula, and the lowest from the Aqua Martia. The arch of the aqueduct of the Aqua Claudia is of hewn stone, very beautiful; that of the aqueduct of the Aqua Neronia is of bricks: they are each of them seventy-two Roman feet in height. The canal of the aqueduct which was called Aqua Appia, deserves to be mentioned for a singularity which is observed in it; for it is not, like the others, plain, nor gradual in its descent, but much narrower at the lower than the higher end. The consul Frontinus, who superintended the aqueducts under the emperor Nerva, mentions nine of them which had each 13,594 pipes of an inch in diameter. Vigerus observes, that, in the space of twenty-four hours, Rome received 500,000 hogsheads of water. Not to mention the aqueducts of Drusus and Rhiminius, that which gives the most striking idea of Roman magnificence, is the aqueduct of Metz, of which a great number of arcades still remain. These arcades crossed the Moselle, a river which is of vast breadth at that place. The copious sources of Gorze furnished water for the representation of a sea-fight. This water was collected in a reservoir; whence it was conducted by subterraneous canals formed of hewn-stone, and so spacious, that a man could walk erect in them: it traversed the Moselle upon its superb and lofty arcades, which may still be seen at the distance of two leagues from Metz; so nicely wrought, and so finely cemented, that except those parts in the middle which have been carried away by the ice, they have resisted, and will still resist, the severest shocks of the most violent seasons. From these arcades, other aqueducts conveyed the waters to the baths, and to the place where the naval engagement was exhibited.

If we may trust Colmenarus, the aqueduct of Segovia may be compared with the most admired labours of antiquity. There still remain one hundred and fifty-nine arcades, wholly consisting of stones enormously large, and joined without mortar. These arcades, with what remains of the edifice, are one hundred and two feet high; they are formed in two ranges, one above another. The aqueduct flows through the city, and runs beneath the greatest number of houses, which are at the lower end. After these enormous structures, we may be believed when we speak of the aqueduct which Louis XIV. caused to be built near Maintenon, for carrying water from the river Bucq to Versailles: it is perhaps the greatest aqueduct now in the world, being 7000 fathoms in length, above 2560 in height, and containing no fewer than two hundred and forty-two arcades.

CRICHUP LINN.—This is a very beautiful cascade, formed by the rivulet Crichup, in Berwickshire. It falls over a precipice about eighty-five or ninety feet high, and almost perpendicular. About a half a mile below this, descends a hill of red free-stone, forming a linn, or waterfall, peculiarly romantic. The linn from top to bottom is upwards of a hundred feet, and though twenty deep, it is yet so narrow at the top, that one might easily leap across it, were it not for the tremendous prospect below, and the noise of the water running its dark course, and by its deep murmuring, affrighting the imagination. “In the time of persecution, (says the Rev. Mr. Yorstoun,) the religious flying from their persecutors found an excellent hiding-place in Crichup Linn; and there is a seat, cut out by nature in the rock, which, having been the retreat of a shoemaker in those times, has ever since borne the name of the Sutor’s Seat. Nothing can be more striking than the appearance of this linn from its bottom. The darkness of the place, upon which the sun never shines; the ragged rocks rising over one’s head, and seeming to meet at the top, with here and there a blasted tree bursting from the crevices; the roaring of the water, together with some degree of danger to the spectator, while he surveys the striking objects—all naturally tend to work upon the imagination. Hence many fabulous stories which are told, were once believed concerning this curious linn.”

EDDYSTONE ROCKS.—This is the name of some rocks in the English Channel, so called from the variety of contrary currents in their vicinity. They are situated nearly S. S. W. from the middle of Plymouth Sound, their distance from the port is about fourteen miles, and from Rame Head, the nearest point of land, twelve and a half. They are almost in the line which joins the Start and Lizard points; and as they lie nearly in the direction of vessels coasting up and down the channel, they were very dangerous, and ships were sometimes wrecked on them, before the lighthouse was established. They are so exposed to the swells of the ocean, from all the south and west points of the compass, that the heavy seas come uncontrolled, and break on them with the utmost fury. Sometimes after a storm, when the sea in general is, to all appearance, quite smooth, and its surface unruffled by the slightest breeze, the growing swell or under current, meeting the slope of the rocks, the sea beats dreadfully upon them, and even rises above the lighthouse in a magnificent manner, overtopping it, for the moment, as with a canopy of frothy wave. Notwithstanding this tremendous swell, Mr. Henry Winstanley, in 1696, undertook to build a lighthouse on the principal rock; and he completed it 1700. This ingenious mechanic was so

confident of the stability of his structure, that he declared his wish to be in it during the most tremendous storm that could blow. Unfortunately he obtained his wish, for he perished in it, during the dreadful storm which destroyed it on the 27th of November 1703. In 1709, another lighthouse was erected of wood on this rock, but on a different construction, by Mr. John Rudyard. It stood till 1755, when it was burnt. A third one, of stone, was begun by the late celebrated Mr. John Smeaton, on the 2d of April, 1757, and finished 24th of August, 1759; and has withstood the rage of all weathers ever since. The rock which slopes towards the south-west is cut into horizontal steps; into which are dovetailed, and united by a strong cement, Portland stone, and granite: for Mr. Smeaton discovered, that it was impossible to make use of the former entirely, as there is a marine animal that can destroy it; and that he could not use the latter solely, as the labour of working it would have been too expensive. He therefore used the one for the internal, and the other for the external part of the structure. Upon the principle of a broad base and accumulation of matter, the whole, to the height of thirty-five feet from the foundation, is a solid mass of stones engrafted into each other, and united by every kind of additional strength. The lighthouse has four rooms, one over another, and at the top a gallery and lantern. The stone floors are flat above, but concave below, and are kept from pressing against the sides of the building by a chain let into the walls. The lighthouse is nearly eighty feet high, and withstands the most violent storms, without sustaining the smallest injury. It has now stood above sixty-three years, during which time it has been often assaulted by all the fury of the elements; and, in all probability, as Mr. Smeaton said, nothing but an earthquake can destroy it. The wooden part of it, however, was burnt in 1770, but renewed in 1774.

DISMAL SWAMP,—is a morass in North America, reaching from Albermarle Sound, in North Carolina, to the neighbourhood of Portsmouth, on the opposite side of the harbour to Norfolk. It is supposed to contain about two hundred and fifty square miles, or one hundred and fifty thousand acres.

Some of the interior parts of this vast swampy plain are seldom explored, being full of danger; yet several adventurous huntsmen sometimes pursue their game within its precincts, but they cannot advance far without great risk of forfeiting their lives to their temerity.

Mr. Janson a late traveller, relates, that in one of these excursions he was often knee-deep, though, in other parts, the ground supported him firmly. In endeavouring to pass one of these funny spots, he attempted to avail himself of a

sort of bridge, formed of the body of a very large tree; when, to his surprise, he was suddenly immersed in dust up to his waist, the tree having become rotten, or probably eaten out by insects, though it retained its shape, and appearance of solidity. Wild beasts lurk in this impenetrable recess: cattle also stray there, and often become wild: hogs are turned into it by their owners, to fatten upon the acorns that fall from the oaks.

Lake Drummond is situated near the centre of the swamp, and is formed by the drainings of this immense bog. It is crowded with fish of various kinds, which, living unmolested, attain a prodigious size.

CURIOUS WINE CELLAR.—The monastery of Arcadi, in Candia, surpasses every other part of the island, though fertile in religious houses, both in the number of monks, and the endowment of the convents. It is supposed to be built on the spot where the ancient Arcadia once stood. The house itself contains nearly one hundred inhabitants, while about two hundred more are dispersed over the lands belonging to the monastery, and are employed in agriculture. The cellar is by far the finest part of the building. It contains two hundred casks of wine, of which the choicest is marked with the name of the superior, and no one may touch it without his permission. This cellar receives a solemn annual benediction immediately after the vintage. The prayer recited by the superior on this occasion, is printed in the Greek Spiritual; it is as follows:—"Lord God! who lovest mankind, look on this wine, and on those that shall drink it; bless those vessels as thou hast blessed the wells of Jacob, the fishpool of Siloa, and the beverage of thy holy apostles. Lord, who didst condescend to be present at the marriage of Cana, where thou didst manifest thy glory to thy disciples by changing water into wine, send thy holy Spirit on this wine, and bless it in thy name."

MINT OF SEGOVIA.—At the mint of Segovia, in Spain, there is an engine moved by water, but so artificially made, that one part of it distends an ingot of gold into the breadth and thickness requisite to make coin. "It delivereth the plate that it hath wrought unto another, that printeth the figure of the coin upon it; and from thence it is turned over to another, that cutteth it according to the print in due shape and weight. And lastly, the several pieces fall into a coffer in another room, where the officer, whose charge it is, finds treasure ready coined."

REMARKABLE MILLS.—At Dantzic, a city of Prussia, Mr

MORRISON, an ingenious traveller of this nation, saw a mill, which, without help of hands, did saw boards, having an iron wheel, which did not only drive the saw, but also did hook in, and turn the boards unto the saw. Dr. John Dee mentions the like seen by him at Prague; but whether the mill moved by wind or water, is set down by neither of them.

SILK MILL AT DERBY.—This mill, situated on the river Derwent, was erected by Sir T. Loombe, who, at a vast expense and great hazard, brought the model from Italy. It is fixed in a large house, six stories high, and consists of 26,586 wheels, with 97,746 movements, all driven by one large water-wheel, fixed on the outside of the house! It goes round three times in one minute, and each time works 78,726 yards of silk thread, so that in twenty-four hours it works 318,496,320 yards of silk thread, under the management of only one regulator! It has been of such service to the silk trade, that Sir Thomas had the benefit of it during his life; but the parliament having allowed him £14,000, as a further reward for his services, he suffered a model of it to be taken. This model now lies in the Record-office at the Tower, for the benefit of the public, any person being allowed to inspect it, so that there are at present several mills of the kind erected in different parts of the kingdom.

PORTLAND VASE.—This is a celebrated funeral vase, which was long in the possession of the Baberini family; but which was some years since purchased for 1000 guineas by the duke of Portland, from whom it has derived its present name. Its height is about ten inches; and its diameter, where broadest, six. There are a variety of figures upon it, of most exquisite workmanship, in bas relief, in white opaque, raised on a ground of deep blue glass, which appears black, except when held against the light. It appears to have been the work of many years; and there are antiquarians who date its production several centuries before the Christian era, since, as has been said, sculpture was declining in excellence in the time of Alexander the Great. Respecting the purpose of this vase, and what the figures on it were meant to represent, there have been various conjectures. We shall, therefore, give a short account of the several figures, without noticing any of the theories or conjectures that have been made about them. In one compartment, three exquisite figures are placed on a ruined column, the capital of which is fallen, and lies at their feet among other disjointed stones: they sit under a tree, on loose piles of stone. The middle figure is a female in a reclining and dying attitude, with an inverted torch in her left hand, the elbow of which supports her as she sinks, while the right

hand is raised, and thrown over her drooping head. The figure on her right hand is a man, and that on the left a woman, both supporting themselves on their arms, and apparently thinking intensely. Their backs are to the dying figure, and their faces are turned towards her, but without an attempt to assist her. On another compartment of the vase is a figure coming through a portal, and going down with great timidity into a darker region, where he is received by beautiful female, who stretches forth her hand to help him: between her knees is a large and playful serpent. She sits with her feet towards an aged figure, having one foot sunk into the earth, and the other raised on a column, with his chin resting on his hand. Above the female figure is a Cupid preceding the first figure, and beckoning him to advance. This first figure holds a cloak or garment, which he seems anxious to bring with him, but which adheres to the side of the portal through which he has passed. In this compartment there are two trees, one of which bends over the female figure, and the other over the aged one. On the bottom of the vase, there is another figure on a larger scale than the one we have already mentioned, but not so well finished nor so elevated. This figure points with its finger to its mouth. The dress appears to be curious and cumbersome, and above there is a foliage of a tree. On the head of the figure there is a Phrygian cap: it is not easy to say whether this figure be male or female. On the handles of the vase are represented two aged heads with the ears of a quadruped, and from the middle of the forehead rises a kind of tree without leaves: these figures are, in all probability, mere ornaments, and have no connection with the story represented on the vase.

MURDERING STATUE.—Kenith, king of Scotland, had slain Cruthlintus the son, and Malcolmus Duffus the king and kinsman of Fenella: she, to be revenged of the murderer, caused a statue to be framed with admirable art. In one of the hands of it was an apple of gold set full of precious stones, which, whosoever touched, was immediately slain with many darts, which the statue threw or shot at him. Kenith, suspecting nothing, was invited to this place, and being slain in this manner, Fenella escaped over into Ireland.

A CURIOUS PULPIT.—The pulpit of the grand parochial church at Brussels, a curious production of Henry Verbruggen, of Antwerp, is placed in the middle of the nave. At the base are Adam and Eve, large as life, the expelling Angel and Death in the rear! Our first parents, though closely pursued, bear upon their shoulders the terrestrial globe, the cavity of which is filled by the preacher! From the globe rises a tree, whose

top extends into a canopy sustaining an Angel, and Truth exhibited as a female genius. Above are the Virgin and the infant Jesus, crushing the serpent's head with a cross. The steps on either side appear as if cut from trunks of trees, and are accompanied by carvings of the ostrich, eagle, peacock, parrot, &c.



CHAP. LXXXVI.

MISCELLANEOUS CURIOSITIES.—(Continued.)

Extraordinary Echoes, and Whispering Places—Natural Productions resembling Artificial Compositions—Remarkable Lamps.—Perpetual Fire—Magical Drum—An Extraordinary Cannon.—Curious Account of Old Bread—Substitute for Spectacles—Winter Sleep of Animals and Plants.

EXTRAORDINARY ECHOES, AND WHISPERING PLACES.—

These are places where a whisper, or other low sound, may be heard from one part to another, to a great distance. They depend on a principle, that the voice, &c. being applied to one end of an arch, easily passes by repeated reflections to the other.

Hence sound is conveyed from one side of a whispering gallery to the opposite one, without being perceived by those who stand in the middle. The form of a whispering-gallery is that of a segment of a sphere, or the like arched figure. All the contrivance in whispering-places is, that near the person who whispers there may be a smooth wall, arched either cylindrically or elliptically. A circular arch will do, but not so well.

The most considerable whispering-places in England are, the whispering-gallery in the dome of St. Paul's, London, where the ticking of a watch may be heard from side to side, and a very easy whisper be sent all round the dome. The famous whispering-place in Gloucester Cathedral, is no other than a gallery above the east end of the choir, leading from one side thereof to the other. It consists of five angles and six sides; the middlemost of which is a naked window, yet two whisperers hear each other at the distance of twenty-five yards.

In the Philosophical Transactions for 1746, there is a letter inserted from Robert Southwell, Esq. in which he gives the following account of some extraordinary whispering-places and echoes,—“The best whispering-place in England,” he observes, “I ever saw, was that at Gloucester: but in Italy,

in the way to Naples, two days from Rome, I saw, in an inn, a room with a square vault, where a whisper could be easily heard at the opposite corner, but not at all in the side corner that was near to you.

"I saw another, in the way from Paris to Lyons, in the porch of a common inn, which had a round vault: but neither of these was comparable to that of Gloucester; only the difference between these last two was, that to the latter, by holding your mouth to the side of the wall, several could hear you on the other side; the voice being more diffused: but to the former, it being a square room, and you whispering in the corner, it was only audible in the opposite corner, and not to any distance from thence, as to distinction of words. And this property was common to each corner of the room.

"As to Echoes, there is one at Brussels that answers fifteen times: but when at Milan, I went two miles from thence to a nobleman's palace, to notice one still more extraordinary. The building is of some length in the front, and has two wings projecting forward; so that it wants only one side of an oblong figure. About one hundred paces before the house, there runs a small brook, and that very slowly; over which you pass from the house into the garden. We carried some pistols with us, and, firing one of them, I heard fifty-six reiterations of the noise. The first twenty were with some distinction; but then, as the noise seemed to fly away, and the answers were at a great distance, the repetition was so doubled, that you could hardly count them all, seeming as if the principal sound was saluted in its passage by reports on this and that side at the same time. Some of our company reckoned above sixty reiterations, when a louder pistol was discharged."

Some persons tell us, that the sound of one musical instrument in this place will seem like a great number of instruments playing together in concert. This echo is of the multiple or tautological kind, returning one sound several times successively, so as to make one clap of the hands seem like many,—one *ha*, like a laughter,—or one instrument like several of the same kind, imitating each other; and by placing certain echoing bodies in such a manner, that any note played should be returned in thirds, fifths, and eighths, a musical room may be so contrived, that not only one violin played therein shall seem many of the same sort and size, but even a concert of different instruments. Those echoes which return the voice but once are called single; whereof some are tonical, only repeating when modulated into some particular musical tone. Others, that repeat many syllables or words, are termed polysyllabical; of which kind is the fine echo in Woodstock Park, which Dr. Plott assures us will return seventeen syllables.

bles distinctly in the day-time, and in the night twenty. Barthius likewise, in his notes on Statius's *Thebais*, mentions an echo near Bingen in Germany, which would repeat words seventeen times, as he himself had proved; and what is very strange in this echo, the person who speaks is scarcely heard at all, but the repetition most clearly, and always in surprising varieties, the echo seeming sometimes to approach nearer, and sometimes to retire to a greater distance. Vitruvius tells us, that in several parts of Greece and Italy there were brazen vessels artfully ranged under the seats of the theatres, to render the sound of the actors' voices more clear, and make a kind of echo; by which means, of the prodigious number of persons present, every one might hear with ease and pleasure.

KNOUT.—This is a punishment inflicted in Russia, with a kind of whip called *knout*, and made of a long strap of leather prepared for this purpose. With this whip the executioners dexterously carry a slip of skin from the neck to the bottom of the back, laid bare to the waist; and repeating their blows, in a little while rend away all the skin off the back in parallel strips. In the common knout, the criminal receives the lashes suspended on the back of one of the executioners; but in the great knout, which is generally used on the same occasions as racking on the wheel was in France, the criminal is raised into the air by means of a pulley fixed to the gallows, and a cord fastened to the two wrists, which are tied together; a piece of wood is placed between his two legs, which are also tied together; and another of a crucial form under his breast. Sometimes his hands are tied behind over his back, and when he is pulled up in this position, his shoulders are dislocated. The executioners can make this punishment more or less cruel; and it is said, they are so dexterous, that when a criminal is condemned to die, they can make him expire either by one or several lashes.

NATURAL PRODUCTIONS RESEMBLING ARTIFICIAL COMPOSITIONS.—Some stones are preserved by the curious, for representing distinctly figures traced by Nature alone, and without the aid of Art.

Pliny mentions an agate, in which appeared, formed by the hand of Nature, Apollo amidst the Nine Muses, holding a harp. Majolus assures us, that at Venice another is seen, in which is naturally formed the perfect figure of a man. At Pisa, in the church of St. John, there is a similar natural production, which represents an old hermit in a desert, seated by the side of a stream, and who holds in his hands a small bell, as St. Anthonny is commonly painted. In the temple of

St. Sophia, at Constantinople, there was formerly, on a white marble, the image of St. John the Baptist, covered with the skin of a camel, with this only imperfection, that nature had given but one leg.—At Ravenna, in the church of St. Vital, a Cordelier is seen on a dusky stone. In Italy, a marble was found, in which a crucifix was so elaborately finished, that there appeared the nails, the drops of blood, and the wounds, as perfectly as the most excellent painter could have performed.—At Sneilberg, in Germany, they found in a mine a certain rough metal, on which was seen the figure of a man, who carried a child on his back.—In Provence, was found, in a mine, a quantity of natural figures of birds, trees, rats, and serpents; and in some places of the western parts of Tartary, are seen on divers rocks, the figures of camels, horses, and sheep. Pancirollus, in his *Lost Antiquities*, attests, that in a church at Rome, a marble perfectly represented a priest celebrating mass, and raising the host. Paul III. conceiving that art had been used, scraped the marble to discover whether any painting had been employed; but nothing of the kind was discovered.

There is a species of the orchis found in the mountainous parts of Lincolnshire, Kent, &c. Nature has formed a bee, apparently feeding in the breast of the flower, with so much exactness, that it is impossible at a very small distance to distinguish the imposition. Hence the plant derives its name, and is called the *Bee Flower*. This is elegantly expressed by Langhorne, who thus notices its appearance:

See on that flow'ret's velvet breast,
How close the busy vagrant lies!
His thin-wrought plume, his downy breast,
Th' ambrosial gold that swells his thighs.
Perhaps his fragrant load may bind
His limbs; we'll set the captive free:—
I sought the living Bee to find,
And found the picture of a Bee.

REMARKABLE LAMPS.—Cedrenus makes mention of a lamp, which, together with an image of Christ, was found at Edessa, in the reign of the Emperor Justinian. It was set over a certain gate there, and privily enclosed, as appeared by the date of it, soon after Christ was crucified: it was found burning, as it had done for five hundred years before, by the soldiers of Cosroes, king of Persia, by whom also the oil was taken out, and cast into the fire; which occasioned such a plague, as brought death upon almost all his forces.—At the demolition of our monasteries here in England, there was found, in the supposed monument of Constantius Chlorus, (father to the Great Constantine,) a lamp, which was thought to have continued burning there ever since his burial, which

was about three hundred years after Christ. The ancient Romans used in that manner to preserve lights in their sepulchres a long time, by the oil of gold, resolved by art into a liquid substance.

PERPETUAL FIRE.—In the peninsula of Abeheron, in the province of Schirwan, formerly belonging to Persia, but now in Russia, there is found a perpetual, or as it is there called, an eternal fire. It rises, and has risen from time immemorial, from an irregular orifice in the earth, of about twelve feet in depth, with a constant flame. The flame rises to the height of six or eight feet, unattended with smoke, and it yields no smell. The aperture, which is about one hundred and twenty feet in width, consists of a mass of rock, ever retaining the same solidity and the same depth. The finest turf grows about the borders, and at the distance of two toises, are two springs of water. The neighbouring inhabitants have a sort of veneration for this fire, which they accompany with religious ceremonies.

MAGICAL DRUM.—This is an instrument of superstition, used in Lapland, which is thus described by Schœffer, in his History of that country: It is made of beech, pine, or fir, split in the middle, and hollowed on the flat side where the drum is to be made. The hollow is of an oval figure, and is covered with a skin clean dressed, and painted with figures of various kinds, such as stars, suns and moons, animals and plants, and even countries, lakes, and rivers; and of later days, since the preaching of Christianity among them, the acts and sufferings of our Saviour and his apostles are often added among the rest. All these figures are separated by lines into three regions or clusters. There is, besides these parts of the drum, an index and a hammer. The index is a bundle of grass or iron rings, the largest of which has a hole in its middle, and the smaller ones are hung to it. The hammer, or drumstick, is made of the horn of a reindeer; and with this they beat the drum so as to make these rings move, they being laid on the top for that purpose. In the motion of these rings about the pictures figured on the drum, they fancy to themselves some prediction in regard to the things they inquire about. What they principally search into by this instrument, are three things: 1. What sacrifices will prove most acceptable to their gods: 2. What success they shall have in their occupations, as hunting, fishing, curing diseases, and the like: and 3. What is done in places remote from them. On these occasions they use several peculiar ceremonies, and place themselves in various odd postures as they beat the drum, which influences the rings to the one or

the other side, and to come nearer to the one or the other set of figures. And when they have done this, they have a method of calculating a discovery, which they keep as a great secret, but which seems merely the business of the imagination in the diviner or magician.

AN EXTRAORDINARY CANNON.—At Kubberpore-na-Jeal, in India, there is a cannon two hundred and thirteen inches long, sixty-six inches round the muzzle, and eighteen inches round the calibre. It has five, and had originally six, equidistant rings, by which it was lifted up. This gun is called by the natives, Jaun Kushall, or the destroyer of life, and its casting and position are attributed to the doctas or divinities, though its almost obliterated Persian inscriptions declare its formation by human means. But what is most extraordinary about it is, that two peepul trees have grown both cannon and carriage into themselves. Fragments of the iron, a spring, one of the linches, and part of the wood-work, protrude from between the roots and bodies of these trees; but the trees alone entirely support the gun, one of the rings of which, and half of its whole length, are completely hidden between, and inside their bark and trunks. A more curious sight, or a cannon more firmly fixed, though by the mere gradual growth of two trees, cannot well be imagined. The Indians assert that it was only once fired, and then sent the ball twenty-four miles!—*Asiatic Journal*.

OLD BREAD.—Bartholinus assures us, that in Norway the inhabitants make bread which keeps thirty or forty years; and that they are there fonder of their old hard bread, than others are of new or soft; since the older it is, the more agreeable it grows. For their great feasts, particular care is taken to have the oldest bread; so that at the christening of a child, they have usually bread which had been baked perhaps at the christening of his grandfather! It is made by a mixture of barley and oatmeal, baked between two hollow stones.

The following is said to be **A SUBSTITUTE FOR SPECTACLES.**—A man, especially if accustomed to spend his time among books, would be much to be pitied, when his sight begins to fail, could he not in a great measure restore it by the aid of spectacles; but there are some men whose sight cannot be aided by the use either of convex or concave glasses. The following method, adopted by one of these to aid his sight, is certainly worthy of notice. When about sixty years of age, this man had almost entirely lost his sight, seeing nothing but a kind of thick mist, with little black specks

which appeared to float in the air. He knew not any of his friends; he could not even distinguish a man from a woman; nor could he walk in the streets without being led. Glasses were of no use to him; the best print, seen through the bell spectacles, seemed to him like a daubed paper. Wearied with this melancholy state, he thought of the following expedient. He procured some spectacles with very large rings; and taking out the glasses, substituted in each circle a conic tube of black Spanish copper. Looking through the large end of the cone, he could read the smallest print placed at its other extremity. These tubes were of different lengths, and the openings at the end were also of different sizes; the smaller the aperture, the better could he distinguish the smallest letters; the larger the aperture, the more words or lines it commanded; and consequently, the less occasion was there for moving the head and the hand in reading. Sometimes he used one eye, sometimes the other, alternately relieving each; for the rays of the two eyes could not unite upon the same object when thus separated by two opaque tubes. The thinner these tubes, the less troublesome are they. They must be totally blackened within, so as to prevent all shining, and they should be made to lengthen or contract, and enlarge or reduce the aperture, at pleasure. When he placed convex glasses in these tubes, the letters indeed appeared larger, but not so clear and distinct as through the empty tube; he also found the tubes more convenient when not fixed in the spectacle rings; for when they hung loosely, they could be raised or lowered with the hand, and one or both might be used, as occasion required. It is almost needless to add, that the material of the tubes is of no importance, and that they may be made of iron or tin as well as of copper, provided the insides of them be sufficiently blackened.—See *La Nouvelle, Bigaruré* for February, 1754, or *Monthly Magazine* for April, 1799.

WINTER SLEEP OF ANIMALS AND PLANTS.—The winter sleep is a very singular property of animals and plants; and, though it occurs daily before our eyes, we are not able to explain the phenomena with which it is attended. In cold countries, many animals, on the approach of winter, retire to their subterraneous abodes, in which they bury themselves under the snow, where they remain five or six months without nourishment or motion; nay, almost without circulation of their blood, which flows only sluggishly, and in the widest vessels. Their perspiration is almost imperceptible; but still they lose something by it, as they enter their winter quarters in very good condition, and are exceedingly thin when they return from them.

Some animals enjoy their winter sleep under the earth, and others are concealed beneath the snow; some for the same purpose creep into the holes of rocks, and others under stones, or the bark of trees.

Plants have their winter sleep also; for, during the period of winter, their sap flows towards the roots, and the circulation of it, which is very slow, takes place only in the widest vessels. Were the expansion of the sap in winter as considerable as in summer, it would burst all the vessels, on being frozen.

Some observers have endeavoured to prove that this singular circumstance is merely accidental, and, indeed, no difference is found in the internal organization of those animals which have winter sleep, and those which have not. It is very remarkable, that this property belongs in general to animals of prey. As these have far stronger powers of digestion, and stronger digestive juices, it would appear that abstinence from food for several months would to them be hardly possible.

The common bear, the bat, and the hedgehog, have winter sleep, but the white bear has not. As the latter is secured from the cold by his long hair, he finds nourishment in the dead whales and seals which are cast on shore by the waves.

The earthworms have winter sleep; but aquatic worms very seldom. Insects, as well as their larvæ, have winter sleep. Butterflies may be often seen fluttering about in the warm days of spring, after having spent the whole winter in that condition. Amphibious animals have winter sleep, those which live merely in the ocean excepted. Few birds, on the other hand, are exposed to this state. The greater part of these, on the approach of winter, retire to a milder climate, where they can find more abundant nourishment. In Iceland, the sheep have winter sleep. In that country they are suffered to range in perfect freedom. In the winter season, therefore, they may be found buried under the snow, where it would be impossible for them to remain, were they not in that condition.

CHAP. LXXXVII.

MISCELLANEOUS CURIOSITIES—(Continued.)

Lama—Nun—Mahometan Paradise—Opinions respecting Hell—London—Coins of the Kings of England—Coinage and Coins of the United States.

LAMA.—This is the sovereign pontiff, or rather god, of the Asiatic Tartars, inhabiting the country of Barantola. The lama is not only adored by the inhabitants of the country, but also by the kings of Tartary, who send him rich presents, and go in pilgrimage to pay him adoration, calling him *lama congiu*, i. e. "god, the everlasting father of heaven." He is never to be seen but in a secret place of his palace, amidst a great number of lamps, sitting crosslegged upon a cushion, and adorned all over with gold and precious stones; where at a distance they prostrate themselves before him, it not being lawful for any to kiss his feet. He is called the great lama, or lama of lamas; that is, "priest of priests." The orthodox opinion is, that when the grand lama seems to die either of old age or infirmity, his soul in fact only quits a crazy habitation to look for another younger or better; and it is discovered again in the body of some child, by certain tokens known only to the lamas, or priests, in which order he always appears. A particular account of the pompous ceremonies attending the inauguration of the infant lama in Thibet, is given in the first volume of the Asiatic Researches. The emperor of China appears, on such occasions, to act a very conspicuous part, in giving testimony of his respect and zeal for the great religious father of his faith.

The twenty-eighth day of the seventh moon, corresponding nearly (as their year commences with the vernal equinox) with the middle of October, is reckoned the most auspicious for the ceremony of inauguration. The procession, on these occasions, from Terpalang to the Teeshoo Loombo, is conducted with such slow and majestic solemnity, that though the distance is only twenty miles, it takes up three days. The crowd of spectators is immense. The three next days are spent in the inauguration, in delivering the presents sent by the emperor to the lama, and in the public festivals on the occasion; during which, all who are at the capital are entertained at the public expense, and alms are distributed liberally to the poor. Universal rejoicings prevail throughout Thibet; banners are unfurled on all their fortresses, the peasantry fill

up the day with music and festivity, and the night is cheered by general illuminations. A long period is afterwards employed in making presents and public entertainments to the newly-inducted lama, who, at the time of his accession to the *musnud*, or pontificate of Teeshoo Loombo, is often not three years of age. The whole ceremony, from its commencement to its consummation, lasts forty days.

Some particulars respecting NUNS.—A nun is a woman dedicated to the severer duties of religion, secluded in a cloister from the world, and debarred by a vow from the converse of men. When a woman is to be made a nun, the habit, veil, and ring of the candidate, are carried to the altar; and she herself, accompanied by her nearest relations, is conducted to the bishop, who, after mass and an anthem (the subject of which is, “that she ought to have her lamp lighted, because the bridegroom is coming to meet her,”) pronounces the benediction: then she rises up, and the bishop consecrates the new habit, sprinkling it with holy water. When the candidate has put on her religious habit, she presents herself before the bishop, and sings on her knees, *Ancilla Christi sum*, &c.; then she receives the veil, and afterwards the ring, by which she is married to Christ; and lastly, the crown of virginity. When she is crowned, an anathema is denounced against all who shall attempt to make her break her vows.

MAHOMETAN PARADISE.—The paradise of the Mahometans is said by them to be situated above the seven heavens, or in the seventh, and next under the throne of God; and, to express the amenity of the place, they tell us that the earth of it is of the finest wheat flour, or of the purest musk, or of saffron; and that its stones are pearls and jacinths, the walls of its buildings enriched with gold and silver, and the trunks of all its trees of gold, amongst which the most remarkable is the tree *luba*, or tree of happiness. They pretend that this tree stands in the palace of Mahomet, though a branch of it will reach to the house of every true believer, loaded with pomegranates, grapes, dates, and other fruits, of surprising size, and delicious tastes, unknown to mortals.

If a man desires to eat of any particular kind of fruit, it will immediately be presented to him; or if he chooses flesh, birds ready dressed will be set before him, and such as he may wish for. They add, that this tree will supply the blessed,

not only with fruit, but with silk garments also, and beasts to ride on, adorned with rich trappings, all which will burst forth from the fruit; and that the tree is so large, that a person mounted on the fleetest horse would not be able to gallop from one end of its shade to the other in one hundred years. Plenty of water being one of the greatest additions to the pleasantness of any place, the Koran often speaks of the rivers of paradise as the principal ornament. Some of these rivers are said to flow with water, some with milk, some with wine, and others with honey: all of them have their sources in the root of this tree of happiness; and, as if these rivers were not sufficient, we are told that the garden of this paradise is also watered by a great number of lesser springs and fountains, whose pebbles are rubies and emeralds, their earth of camphor, their beds of musk, and their sides of saffron.

But all these glories will be eclipsed by the resplendent and exquisite beauty of the girls of paradise, the enjoyment of whose company will constitute the principal felicity of the faithful. These (they say) are not formed of clay, as mortal women, but of pure musk, and are, as their prophet often affirms in his Koran, free from all the natural defects and inconveniences incident to the sex. Being also of the strictest modesty, they keep themselves secluded from public view, in pavilions of hollow pearls, so large, that, as some traditions have it, one of them will be no less than sixteen, or, as others say, sixty miles long, and as many broad. With these the inhabitants of paradise may taste pleasures in their height; and for this purpose will be endowed with extraordinary abilities, and enjoy a perpetual youth.

OPINIONS RESPECTING HELL.—The hell of the ancient heathens was divided into two mansions: the one called Elysium, on the right hand, pleasant and delightful, appointed for the souls of good men; the other called Tartarus, on the left, a region of misery and torment, appointed for the wicked. The latter only was hell, in the present restrained sense of the word. The philosophers were of opinion, that the infernal regions were at an equal distance from all the parts of the earth; nevertheless, it was the opinion of some, that there were certain passages which led thither, as the river Lethe near the Syrtes, and the Acherusian cave in Epirus. At Hermione, it was thought, that there was a very short way to hell; for which reason the people of that country never put the fare into the mouths of the dead to pay their passage. The Jews placed hell in the centre of the earth, and believed it to be situated under waters and mountains. According to them, there are three passages leading to it: the first is in the wilderness, and by that Korah, Dathan, and Abiram

descended into hell; the second is in the sea, because Jonah, who was thrown into the sea, cried to God out of the belly of hell; the third is in Jerusalem, because it is said "the fire of the Lord is in Zion, and his furnace is in Jerusalem." They likewise acknowledged seven degrees of pain in hell, because they find this place called by seven different names in Scripture. In the Koran of Mahomet, it is said that hell has seven gates; the first for the Mussulmans, the second for the Christians, the third for the Jews, the fourth for the Sabeans, the fifth for the Magians, the sixth for the Pagans, and the seventh for hypocrites of all religions.

Among Christians, there are two controverted questions in regard to hell; the one concerning the locality, the other the duration of its torments:—The locality of hell, and the reality of its fire, began first to be controverted by Origen. That father, interpreting the scripture account metaphorically, makes hell to consist, not in external punishments, but in a consciousness or sense of guilt, and a remembrance of past pleasures. Among the moderns, Mr. Whiston advanced a new hypothesis. The comets, he thinks, are so many hells, appointed in their orbits alternately to carry the damned into the confines of the sun, there to be scorched by its violent heat, and then to return with them beyond the orb of Saturn, there to starve them in those cold and dismal regions. Another modern author, Mr Swinden, supposes the sun to be the local hell. However difficult it may be to ascertain the local place of hell, we may rest assured God will find both place and means to punish the obstinately wicked.

LONDON.—This metropolis is unparalleled, in extent and opulence, in the whole habitable globe, except, perhaps, Pekin in China, Jeddo in Japan, and Houssa in Africa; which are all said to be larger.

It comprehends, besides London, Westminster, and Southwark, no less than forty-five villages, of considerable extent, independent of a vast accession of buildings upon the open fields, in the vicinity. Its length is nearly eight miles, its breadth three, and its circumference twenty-six. It contains above 8000 streets, lanes, alleys, and courts, and more than 65 different squares. Its houses, warehouses, and other buildings, make 162,000, besides 246 churches and chapels, 207 meeting houses for dissenters, 43 chapels for foreigners, and 6 synagogues for the Jews, which in all make 504 places of public worship. The number of inhabitants, during the sitting of parliament, is estimated at 3,500,000. Among these are found about 150,000 thieves, coiners and other bad persons.

The annual depredations on the public, by this numerous

body of pilferers, are estimated at the sum of £2,100,000 sterling. In this vast city, there are, moreover, upwards of 4000 seminaries for education, 8 institutions for promoting morality, 10 institutions for promoting the arts, 122 asylums for the indigent, 17 for the sick and lame, 13 dispensaries, 704 charitable institutions, 58 courts of justice, and 7040 professional men connected with the various departments of the law.—There are 13,500 vessels trading in the river Thames in the course of a year; and 40,000 waggons going and returning to the metropolis in the same period, including their repeated voyages and journeys.—The amount of exports and imports to and from the Thames is estimated at £66,811,932 sterling annually, and the property floating in this vast city every year, is £170,000,000. These circumstances may be sufficient to convince us of the amazing extent and importance of the capital of the British empire.

The numbers of bullocks, sheep, lambs, calves, hogs, and sucking pigs, purchased at the Smithfield markets, and annually consumed in the metropolis, are in the following proportion: bullocks 110,000; sheep and lambs 776,000; calves 210,000; hogs 210,000; sucking pigs 60,000. Markets for hay, Tuesday, Thursday, and Saturday. The markets for the sale of provisions are numerous, and amply supplied with every sort, generally of the most excellent kind: the bread generally fine and sound. Besides animal food and bread, there are no less than 6,980,000 gallons of milk [and water] annually consumed here: of vegetables and fruit, there are 10,000 acres of ground near the metropolis, cultivated wholly for vegetables; and about 4000 acres of fruit. Of wheat, coals, ale, and porter, &c. the annual consumption is as follows: of wheat, 700,000 quarters; of coals 600,000 chaldrons; of ale and porter 1,113,500 barrels; of spirits and compounds 11,146,782 gallons; of wine 32,500 tons; of butter 16,600,000 pounds; and of cheese 21,100,000 pounds. Fish and poultry are sometimes excessively dear, and the quantities consumed are comparatively small.

COINS OF THE KINGS OF ENGLAND.—The silver Penny which was first circulated during the Heptarchy, continued to be the general coin after the kingdom had been united under one head, and extends, in a continued series, from Egbert almost to the present reign. The only kings wanting are Edmund Ironside, Richard I., and John. At first the penny weighed twenty-two and a half grains, but towards the close of the reign of Edward III. it fell to eighteen grains; in that of Edward IV. to twelve. In the time of Edward VI. it was reduced to eight grains; and in queen Elizabeth's reign to 7½ grains, at which it still continues.

Halfpence and farthings were first struck in silver by Edward I. in 1280: the former continued to the time of the Commonwealth, but the latter ceased with Edward VI. The groat and half groat were introduced in the reign of Edward III., in 1354, and continue to this day, though not in common circulation.

Shillings were first coined by Henry VII. in 1503; at first they were called testoon, from the teste, tête, or head of the king, upon them; the name shilling being derived from the German *schelling*, under which name coins had been struck at Hamburgh in 1407. The crown was first coined in its present form by Henry VIII. The half-crown, six-pence, and three-pence, were coined by Edward VI. In 1558, queen Elizabeth coined three-halfpenny, and in 1561, three-farthing pieces; but they were discontinued in 1582. Gold was coined in England by Henry III. in 1257; the piece was called a gold penny, and was larger than the silver one, and the execution by no means bad for the time. The series of gold coinage, however, commences properly from Edward III. In 1344, this monarch first struck florins, in imitation of those in Italy; and it is remarkable, that though these coins, at the time they were first issued, bore only six shillings value, they were (even before the late increased value of gold) intrinsically worth nineteen shillings; so much has the value of gold increased since that time. The half and quarter florin were struck at the same time, but only the last has been found. The florin being found inconvenient, gave place to the noble, of six shillings and eight-pence value, and exactly half a mark. The latter had its name from being a limited sum in accounts; and was eight ounces in weight, two-thirds of the money pound. The noble had its name from the nobility of the metal; the gold of which it is coined being of the finest sort. Sometimes it was called *rose-noble*, from both sides being impaled in an undulating circle. It continued, with the half and quarter noble, to be the only gold coin till the angels of Edward IV. appeared in 1465. These had their name from the image of Michael and the Dragon which they bore. The angelites, of three shillings and four-pence value, were substituted in their place. In 1527, Henry VIII. added to the gold coins the crown and half-crown at their present value; the same year he gave sovereigns of twenty-two shillings and six-pence, and ryls of eleven shillings and three-pence, angels at seven shillings and six-pence, and nobles at their old value of six shillings and eight-pence. In 1546 he caused sovereigns to be coined of the value of twenty shillings, and half sovereigns in proportion.

On the union of the two crowns, James gave the sovereign the name of unite; the value continuing twenty shillings, as

before He coined also rose ryals of thirty shillings, spur ryals of fifteen shillings, angels of ten shillings, and angelites of five shillings value. Under the Commonwealth, the sovereign received the name of the twenty shilling piece, and continued current till the coinage of guineas. These were so called, from their being coined of gold brought from the coast of Guinea, and were at first to pass but for twenty shillings, though by a universal but tacit consent, they always passed for twenty-one shillings. Half-guineas, double-guineas, and five guinea pieces, were also coined during the same reign; which still continue, though the two latter are not in common circulation. Quarter-guineas were coined by George I. and likewise by his late Majesty; but they were found so troublesome on account of their small size, that they were stopped at the Bank of England; and therefore are not to be met with in circulation at present. A few pieces of seven shillings value were likewise coined, and are known by the lion above the helmet; but none were issued. In 1668, the guinea rose to twenty-one shillings and sixpence, and continued to increase in value till 1696, when it was as high as thirty shillings; but after the recoinage in 1697 and 1698, it fell by degrees, and in 1717 was at its old standard of twenty-one shillings. During the reign of George III. vast numbers of seven shilling pieces were issued, which continued some years in general circulation. Sovereigns have also been coined since his present Majesty's accession, and they constitute at present the prevailing gold currency of the realm.

COINAGE AND COINS OF THE UNITED STATES.—The principal Mint (or coin manufactory) in the United States is in Philadelphia, Pa. Another large one is in San Francisco, Cal. Nearly all the work is done by machinery, and that of the most ingenious and delicate nature. In converting the metals, silver, copper, (or copper and nickel), into coin the process is almost precisely the same as that of minting gold; so we will confine ourselves to the latter metal. Standard gold in the United States is nine-tenths pure gold, one-tenth alloy. It goes through a course of treatment to anneal it, after which it is drawn to the required thickness of the coin. The "drawings" or ribbons are then cut by machinery into rude circles a little larger than the intended coin. The next thing is to raise the slight rim on the edge. This is done at the rate of 120 double eagles a minute. Again they are annealed and thoroughly cleaned. They are then ready to be struck, the dies being previously prepared. A diagram would be necessary to fully describe the wonderfully ingenious machinery by which coin is struck. It is nearly a perfect automaton, which, when the blanks are fed to it through a tube, takes each blank piece in succession with a "hand,"

and lays it upon the face of the lower die. Both faces of the coin and the fluted edges which are given to all coin (as a guard against filling) are struck at one blow. Then the automaton hand displaces the coin and puts another blank in its place. The pressure for a double eagle is equal to 75 tons. 20,000 pieces can be struck in an hour by the 20 presses at work in one room at the Philadelphia Mint, only one girl and one boy being necessary to each press. From the press-rooms the coins are transferred to the chief coiner's rooms, where they are weighed, examined, and, if found perfect, put into suitable packages for transmission to points of circulation. The double eagles (\$20) weigh 516 grains, and lesser coins in proportion: they are eagles, (\$10), \$5, \$3, \$2.50, and \$1.

A silver dollar weighs 384 grains. Halves, quarters, dimes, and half-dimes in proportion.

The nickel cent—88 parts copper and 12 parts nickel—weighs 72 grains.

The United States Mint was established in 1793.

CHAP. LXXXVIII.

MISCELLANEOUS CURIOSITIES—(*Continued.*)

The Five Human Races—Rome—Rome from the Capitol—Cologne Cathedral—Destruction of the Bastille.—Cleopatra's Barge—Jewish High-Priest—Invention of Printing.

THE FIVE HUMAN RACES.—Ethnologists have generally divided human beings into five distinct classes. But although the primitive types are well and strongly marked, yet from amalgamation, climatic influences, and various other causes, the sharp lines are in many instances almost obliterated. We append a description of the different races as they appear in their pure and unmixed condition.

THE BLACK OR NEGRO RACE.—The Negro, proper, inhabits all that part of Africa from Senegal along the coast of Guinea south of the Equator, to the 16th degree of latitude. Voluntarily the Negro never leaves this country, but, from being carried into involuntary servitude, millions of this people are now to be found in America, the West Indies, and other parts of the world. Their most striking characteristics are the jetty blackness of skin, black, crisp, curly hair, low forehead, high cheek-bones, flat, broad nose, broad and small chin, strong, white teeth. The skull is deficient in all the higher intellectual manifestations.

The Hottentots and Caffres of South Africa, though black, and generally classed with Negroes, differ from them on many points. The Negroes are often called *Ethiopians*. This is a mistake; the Ethiopians were the inhabitants of the Upper Nile and Abyssinia, and though a dark, were by no means a *black* race. The Negroes have no written language; the Arabic is generally used for all business purposes.

THE RED OR INDIAN RACE.—This race occupied the whole of the two Americas and the neighboring islands; although there were manifest differences in the people of the North and those of the South. The North American Indians are tall and straight, forehead low and broad, nose aquiline, eyes black and deeply set, full lips, skin a warm, coppery red, hair long, black, and straight. They show rather a lack of disposition than of ability to become proficient in the arts of agriculture and manufacture.

WHITE OR CAUCASIAN RACE.—The Caucasian race occupies all of Europe, Western Asia, Australia, and the greater part of America. Skin varying from a pure white to a rich brown, hair all shades, from blonde to black, beard full, soft and flowing, nose high and thin, lips medium. Surpass all other races in ability to comprehend and work out both mental and physical problems. This race is gradually but surely dominating the habitable part of the globe.

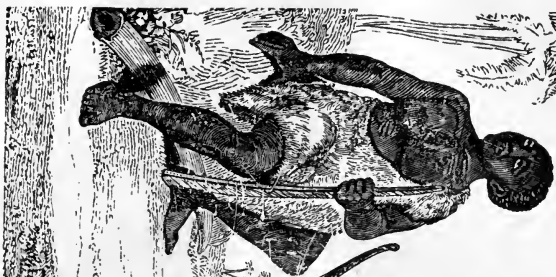
YELLOW, OR MONGOLIAN.—This race dwells principally in the East Indies, China, Japan, and the adjacent islands. In person they are usually small, slender, and remarkable for their agility and skillful manipulation; excelling in taste and execution, rather than invention. Skull small and narrow, with rather flat sides, forehead low and retreating, skin a yellowish tawny, eyes narrow and almond-shaped, hair long, black, and straight, beard very scanty.

THE SAMOIDS, ESQUIMAUX, AND TARTARS.—These people are all supposed to have had a common origin, and their differences are attributed to local habitation or other accidental circumstances. They are short in stature, but sturdy, foreheads low, eyes narrow, nose flat, hair black and straight. In many respects they closely resemble the Mongolian race. The Tartars show capacity for improvement, but the Esquimaux, owing to their painful struggle for mere existence, have little opportunity to exhibit their mental abilities. They are docile and kind.

ROME.—Rome was founded in the year of the world 3230, in the third year of the 6th Olympiad, and in the seven hundred and fifty-third before the Christian era, on Mount Palatine. Rome is the principal, although not the most pleasing figure of the ancient world. The destinies of the noblest part of mankind were intimately connected by fate, during many centuries, with

THE FIVE HUMAN RACES.

ETHIOPIAN.



AMERICAN.



CAUCASIAN.

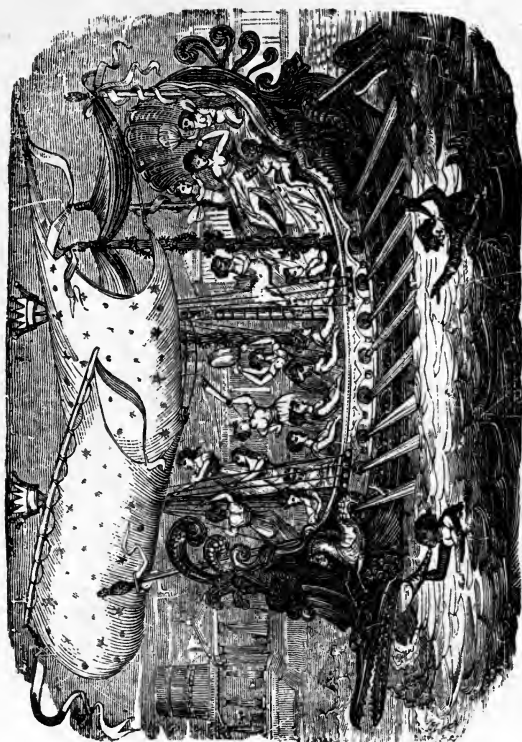


MONGOLIAN.



ESQUIMAUX.





CLEOPATRA'S BARGE.

the events and interests of this imperial city. It at first, by force of arms and policy; then by laws, civilization, and manners; afterwards by sacerdotal power; and at last by her language, has ruled over the world, and enjoyed the veneration of nations in uninterrupted succession. The history of Rome, is, during a considerable space of time, the history of the world. Many of the most important determinations of our condition, at the present day, are derived from the City on the Tiber, and there is hardly one European nation whose history would be intelligible without that of Rome. It contains, besides the richest treasures of great characters and of imposing spectacles, the most impressive evidences of the power of man, and that of fate. It is, in fine, a continuous commentary of policy and political laws, and an illustrating counterpart of the revolutions of the latest times.

ROME FROM THE CAPITOL (*see Frontispiece*).—In the foreground is the Arch of Constantine, the last perfect survivor of the many grand structures of its class, erected by the sovereigns who held sway over the Eternal City. On the left is the Pantheon, a temple devoted to the gods of all nations. It is the only one of the grand temples that have come to our era scarcely marred by either time or man. Its front is a very fine pure Grecian form, while the main part of the structure is a vast rotunda, surmounted by a dome. It owes its preservation to the fact that it was at an early period used as a Christian church, and dedicated to the Virgin. It was erected by Agrippa, and afterward dedicated as we have said. In a prominent part of the picture the Coliseum towers above the surrounding buildings. It was built for and used as a circus, in which gladiatorial and other spectacles were exhibited. Vespasian, the father of Titus, was its founder. It is the largest building for its purpose ever erected by man. It is 581 feet in length, 481 in breadth, 1,616 in circumference. It was of this building that the poet, Byron, wrote :

“ While stands the Coliseum, Rome shall stand ;
When falls the Coliseum, Rome shall fall,
And when Rome falls—the world.”

Nearly in the centre stands Trajan's Pillar, almost perfect, and covered with exquisitely graven bas reliefs. Far in the middle distance is pictured the mighty fane of St. Peter's, the grandest edifice ever reared by mortal hands to the Deity. In size it exceeds every other, it being calculated that it would hold twelve buildings like New York's Trinity within its walls. Its dome is so lofty and widespread as to make visitors feel little beneath it. In various directions are seen that incongruous mixture of noble, half-ruined edifices, squalid huts, and commonplace-looking houses, which render modern Rome unlike any other capitol on the globe.

THE COLOGNE CATHEDRAL.—On the 14th of August, 1880, the last stone of the great Domkirche of Cologne, the foundations of which were laid more than six hundred years ago, was put in its place; and the grandest conception of the Middle-Age Gothic Cathedral builders stands at length complete in all its parts.

This stupendous structure is the largest, and architecturally the purest of the German-Gothic churches. It is believed to have been begun about the middle of the thirteenth century. It stands on the site of an older church, built in the ninth century and destroyed by fire in 1248. The architect is unknown, though the original design has been attributed to Gerhard von Rile. The work on it was carried forward with more or less rapidity up to the time of the Reformation, when it was entirely suspended until about fifty years ago. The choir, the first part completed, was consecrated in 1322. In 1509 the north and south aisles of the nave had only been carried up to the capitals of the columns. A wooden roof was then thrown over them, and in this state the building remained, with only enough repairing to keep it from going to ruin, until the early part of the present century.

Much of the indifference of the German people with respect to the completion of their noblest cathedral was doubtless owing to the fact that the original designs had been lost, and it seemed impossible to surmount the difficulties of structure presented by the two colossal towers with slender open-work spires which were to be the crowning glory of the edifice. But this obstacle was removed by the happy discovery of the design of the main building at Darmstadt in 1818, and subsequently of that of the two towers. This discovery aroused new interest in the great cathedral. The repair of the building was commenced in 1830. Large sums were appropriated by the Government to carry on the work, and money was also raised for the purpose by private subscription, and by an association called the *Dombauverein*, with branches throughout Europe. The amount required to complete the building was estimated by Zwirner, the architect employed to supervise it, at between four and five million dollars. In 1842 the foundation stone of the transept was laid by the King of Prussia. Six years later the nave, aisles, and transept were consecrated, and in 1863 the whole interior was thrown open. From that time on the work has been pushed rapidly forward, until at last, in this "utilitarian age," the splendid dream of the unknown architect is fully realized, a veritable "poem in stone."

The building is 511 feet in length, by 231 in breadth. The towers reach to the imposing height of 511 feet, and the west gable, corresponding to the width, is 231 feet high. The choir is 161 feet high, and the central nave rises to a height of 144 feet, with a breadth of 44 feet. Externally, the building has a

double range of stupendous flying buttresses and intervening piers, bristling with a perfect forest of pinnacles. The form of the church is a cross, and the arches are supported by a quadruple row of sixty-four columns. In the choir there are several stained windows belonging to the fourteenth century, which are regarded as unusually fine. Around the choir, against the columns, stand colossal figures of the Saviour, the Virgin Mary, and the twelve Apostles, sculptured in the same century; and in a small chapel behind the high altar stands the celebrated "Shrine of the Three Kings of Cologne," or Wise Men of the East, whose bones are supposed to repose therein. The other parts of the building have been completed with careful fidelity to the original design, and it is now, in its finished state, as was written of it many years ago, "at once the most regular and most stupendous Gothic monument existing."

THE DESTRUCTION OF THE BASTILE OF PARIS.—This famous prison was originally the castle of Paris, and was built by order of Charles V., between the years 1370 and 1383, by Hugo Aubriot, Provost of Paris, at the Porte St. Antoine as a defense against the English. Afterwards when it came to be used as a State prison it was provided during the 16th and 17th centuries with vast bulwarks and ditches. On each of its longer sides it had four towers of five stories each, over which ran a gallery which was armed with cannon. It was partly in these towers and partly in cellars under the level of the ground that the prison was situated. The unfortunate inmates of these abodes were so effectually removed from the world without as often to be entirely forgotten, and in some cases it was found impossible to discover either their origin or the cause of their incarceration.

The Bastile was capable of containing 70 or 80 prisoners, a number frequently reached during the reigns of Louis XIV. and XV. Though small compared with the number which an ordinary prison contains, these numbers were considerable when we reflect that they rarely ever consisted of persons of the lower ranks or such as were guilty of actual crimes, but of those who were sacrificed to political despotism, court intrigue, ecclesiastical tyranny, or had fallen victims to family quarrels. On the 14th of July, 1789, the fortress was surrounded by an armed mob, which the reactionary policy of the Court had driven into fury, and to the number of which every moment added. The garrison consisted of 82 old soldiers and 32 Swiss. The negotiations which were entered into with the King led to no other result than the removal of the cannon posted on the Faubourg St. Antoine, which by no means contented the exasperated multitude. Some one cut the chains of the first drawbridge, and a contest took place, in which one of the besieged and 150 of the people were killed or wounded; but the arrival of a portion of

the troops, which had already joined the people, with four field pieces, turned the fortunes of the conflict in favor of the besiegers. De Launay, the Governor, who had been prevented by one of his officers, when on the point of blowing the prison into the air, permitted the second drawbridge to be lowered, and the people rushed in, killing De Launay himself and several of his officers. The destruction of the Bastille commenced on the following day amid the thunder of cannon and the pealing of the *Te Deum*. This event in itself apparently of no great moment, leading only to the release of three unknown prisoners, one of whom had been its tenant for thirty years, broke the spirit of the Court party, and changed the current of events in France.

CLEOPATRA'S BARGE.—The vessel in which the lovely and luxurious Queen of Egypt floated upon the Nile, has been described by historians and portrayed by poets at various times. We give Shakespeare's account of it:

"The barge she sat in, like a burnished throne
Burned on the water; the poop was beaten gold;
Purple the sails, and so perfumed, that
The winds were lovesick with them; the oars were silver,
Which to the tunes of flutes kept stroke, and made
The water which they beat to follow faster,
As amorous of their strokes. For her own person,
She beggared all description; she did lie
On her pavilion (cloth of gold and tissue)
O'erpicturing that Venus where we see
The fancy outwork nature; on each side her
Stood pretty dimpled boys, like smiling Cupids,
With divers-colored fans, whose wind did seem
To glow the delicate cheeks which they did cool,
And what they undid, did."

Cleopatra was the daughter of Ptolemy Auletes, King of Egypt, and was co-heir to the throne with her brother. She was robbed of her possessions; but on appealing to Rome she was restored by Julius Cæsar. After his death she became the friend of Marc Antony, who left his wife, Octavia, for love of this bewitching woman. Antony having suffered defeat at Actium, Cleopatra ended her troubled life by allowing an asp to poison her. She was in her thirty-ninth year when she died.

JEWISH HIGH-PRIEST.—While the Israelites had a remarkably high and pure conception of the spiritual attributes of Jehovah, their forms of worship were full of material observances, and their great law-giver, Moses, laid down the most minute directions as to the garb and ornaments that were to be worn by those who ministered at the altar. The Roman Catholic Church has very largely borrowed from the more ancient forms. Nothing can be grander in appearance than the dress worn by the High-Priest of Israel, while its ornamentation is full of symbolism appealing strongly to the imagination. This dress consisted of

a robe, embroidered coat, and a girdle. The colors were blue, scarlet, purple, and white. Embellishing all was abundance of pure gold, the latter curiously enwreathed and interwoven. On the head was worn a high mitre. A rich, broad girdle surrounded the waist, of fine linen, blended in which were the colors of the robe and coat. Two onyx stones, in which were deeply graven the names of the tribes, six on each stone, were affixed, one on each shoulder, into ouches, or sockets, of gold. Upon the front was worn the Breastplate of Judgment, similar to the girdle in material (fine linen), workmanship, and colors. It was adorned with four rows of precious stones, in the following order: first row, a sardoin, a topaz, and a carbuncle; second row, an emerald, a sapphire, and a diamond; third row, a ligure, an agate, and an amethyst; fourth row, a beryl, an onyx, and a jasper. Upon each stone was engraven the name of a tribe. The stones were firmly set in a frame of pure gold. This breast-plate was fastened in its place by golden chains passing through rings of the same metal. In the Breastplate of Judgment were the Urim and Tnummin. The robe having an aperture left in it was passed over the head in attiring. The hems and borders were elaborately worked with gold in figures of bells, and pomegranates, intermingled with threads of the colors already mentioned. In the front of the towering mitre was placed a fine gold plate, on which was engraven the Hebrew legend, *Holiness to the Lord*. Such was the imposing garb of the Jewish High-Priest, as he stood at the altar of the temple when the Roman legionaries waded through flame and gore, and dabbled the high place of Zion with the blood of the ministering servant of Jehovah.

INVENTION OF THE ART OF PRINTING.—To the German nation belongs the glory of this salutary discovery. The true inventor of printing being John Guttenburg (called also Gansfleisch), of the equestrian family of Lorgenloch (born 1397), who conceived the first idea of this art, and executed it at Mentz, with the aid of John Faust (since 1450), a rich goldsmith of that place, and with the subsequent co-operation (since 1453) of Peter Shaeffer, of Gernsheim, who completed the invention. It arrived only gradually and slowly to perfection. Among the great events of the world, no one has been more important in its consequences, and more beneficial, than this grand invention. By this art, writing with letters, consequently also language, and, in general, the human intellect, were first enabled to fulfill completely their destinations; the word of one is transmitted to millions; the treasury of the knowledge as well as of the feelings of all men and of all times, are made the common property of our race—a possession that is partly attained by every individual. Its immediate effect was to render possible the union of nations, and, indeed, of mankind, into one great family.

CHAP. LXXXIX.

MISCELLANEOUS CURIOSITIES CONTINUED.

Dr. Tanner's Fast—Other Long Fasts—Scriptural Fasts—Human Work and Waste—Spirit Rappings—The Ma Turtle—Mesmerism—Hypnotism—Ice Factories—Pulque—Celluloid—Petroleum or Rock Oil—Benzine.

DR. TANNER'S GREAT FAST.—At noon, June 28, 1880, the first entry on the record book was made: "Dr. Henry S. Tanner, aged 49, appeared in Clarendon Hall (New York City), this day to begin a forty days' fast. He declares that he has eaten no solid food to-day, but took for breakfast a quart of milk, and the same quantity for dinner at 11:45 o'clock. His weight, with clothing, is 157½ pounds; temperature, 99 deg.; average pulse, 88, with a variation of from 21 to 24 pulsations per minute; respiration, 18. The Doctor was undressed, and carefully examined. His clothing also was carefully examined to see that no food was therein concealed."

Dr. Tanner's first intention was to take neither food nor water for the space of forty days, but he was persuaded finally to take water, and drank copiously during the first two days. When the second day expired he decided not to take water for the remainder of his fast, and went on without food or water until the expiration of the tenth day. At this time his sufferings had become terrible. He was constantly calling for wet cloths to be placed upon his forehead and wet sponges in his hands. But the surface absorption was not sufficient for the purpose. He commenced the eleventh day by taking at intervals copious draughts of water. His weight at that time was 139½ pounds, and during the next ten days he lost only 4½ pounds, or a little less than 8 ounces per day, against 32 ounces per day of the preceding eight.

At the end of the twentieth day he was in better physical condition than at the end of the tenth day, as his photographs clearly evince. During the third ten days he lost at the daily rate of 12 ounces, but no serious symptoms appeared until he had completed thirty days of his term. The elimination of urea, which was 29 grammes a day when the fast commenced, declined gradually, until at the end of the tenth day it was 13 grammes, at the end of the twentieth about 11 grammes, and at the end of the thirtieth 6 grammes. The method of determination adopted by Dr. Van Der Weyde was an original but extremely accurate one. His data are accordingly of high scientific value.

Near the conclusion of the third ten days Dr. Tanner began to have periodical attacks of nausea and vomiting, accompanied by febrile disturbance. The slight fever recurred every third

day, the gastric symptoms being a great deal worse at each recurrence of the fever, but never disappearing altogether. In this condition he had gone on for the last ten days of his extraordinary performance, growing feebler and feebler as the days wore slowly on, but maintaining his resolution to finish, or at least hold out to the last extremity, which he did.

The following is a table of the loss in weight from day to day:

<i>Day</i>	<i>Pounds.</i>	<i>Day.</i>	<i>Pounds.</i>
1st	157½	25th	131½
3d	153	26th	131½
5th	147½	27th	130½
7th	143½	28th	129½
11th	139½	29th	not taken
13th	136½	30th	130
14th	133	31st	128
16th	132	32d	127½
17th (8:30 p. m.)	133½	33d	126½
17th (11 a. m.)	135½	34th	126
18th	136½	35th	not taken
19th	136	36th	not taken
20th (4 p. m.)	135½	37th	125½
20th (5 a. m.)	135	38th	not taken
21st	135	39th	122½
22d	133½	40th	121½
24th	132½		

The fluctuations of pulse, temperature, and respiration have been unimportant. Contrary to the advice of his physicians, who dreaded gastric fever, Dr. Tanner commenced eating meat and fruits and drinking wine and milk, and speedily regained health and strength.

OTHER LONG FASTS.—Ann Moore, the famous fasting woman of Tutbury, pretended to have lived for eight years entirely without food. A Watch Committee was appointed, which detected the fraud in a very ingenious manner. The bed and bedding, with the woman in it, were placed on a delicate weighing machine, which resulted in the inevitable exposure. At the expiration of the ninth day of this strict watching, being warned that she was sinking, she acknowledged her imposture, and admitted—which is an important fact—that, so long as the watch upon her was but imperfect, her daughter had contrived, when washing her face, to feed her every morning by using towels made very wet with gravy, milk, and other nourishing fluids, and had also while kissing her contrived to convey small portions of solid food from mouth to mouth. Guillaume Granet, a prisoner at Toulouse, resorted to starvation to avoid punishment. For the first seven days the symptoms were not very remarkable. After this period he was compelled to drink water to relieve his raging thirst, and after lingering on in terrible agony he died in convulsions on the fifty-eighth day. The case is reported by Van Swieten. There is no doubt as to its truth.

Viterbi, a Corsican, condemned to death for the assassination of Frediani, resolved to starve himself to death. He died on the twenty-first day. He, too, occasionally moistened his mouth with water. The medical details of his case, which are very horrible, will be found in Paris's "Medical Jurisprudence." Of accidental starvation, the most remarkable example is, perhaps, that reported by Dr. Sloane, of Ayr: "A man, some 65 years of age, of a spare habit of body, and uncommonly vigorous for his time of life, was accidentally incarcerated in a coal mine for twenty-three days, during the first few of which he had access to water strongly impregnated with iron. He then became unable to move, and had unfortunately fallen some distance from the water. In this instance, Dr. Sloane thinks that an impure atmosphere, by lowering the vital powers, might tend to slightly prolong life under circumstances of privation. The unhappy man died on the third day after his removal." In 1866 Captain Casey, of the *James Lowden*, passed twenty-eight days in an open boat without food or water. He contrived however, to drink as much rain as he could collect, and it is, possible, of course, that he may have chewed fragments of his clothes. Thus, then, so far as ascertained cases go, life has actually, on one occasion, been sustained for fifty-eight days without food, but not without water. Some time in 1831 or 1832 a son of Deacon Kelsey, of Fairfield, N. Y., abstained from all manner of food, but drank often of pure cold water and washed freely with it. He gradually wasted away to a mere skeleton, but did not die till the end of *fifty-six* days. Dr. McNaughton, a professor in Fairfield Medical College, wrote an account of this case at the time, the faster having been a student of the college.

SCRIPTURAL CASES OF LONG FASTING.—Moses distinctly states: "I abode in the mount forty days and forty nights; I neither did eat bread nor drink water"; and then upon his return to the mount, after breaking the first two tables of stone, he adds: "And I fell down before the Lord, as at the first, forty days and forty nights; I did neither eat bread nor drink water, because of all your sins." (Deut. ix. 9, 18). Of Elijah it is stated that he was miraculously fed (I. Kings xix. 5-8), and "went in the strength of that meat forty days and forty nights." Of the Saviour it is said (Matt. iv. 2), "He fasted forty days and forty nights." This was "in the wilderness." (See page 65).

HUMAN WORK AND HUMAN WASTE.—Work means waste, equally to a human body and a locomotive engine. "More work more waste," is a motto alike true of the mechanic's apparatus and of the mechanic himself. Not an action, we repeat, is performed by us which is not accompanied by an expenditure of force derived from and accompanied by a proportional waste



DESTRUCTION OF THE BASTILLE.



A JEWISH PRIEST.

of substance. The movements of the muscles, the beating of the heart, the winking of an eyelid, the thinking a thought, entail wear and tear upon the muscles that work and the brain-cells that think. Every action necessitates bodily waste and corresponding physical repair. Waste, however, cannot of necessity be a single and final process in a living body, unless, indeed, we were born with a full complement of matter, and were permitted in the order of nature to live on the principal with which we had been provided, instead of wisely using that principal as a means of gaining a livelihood through the interest it acquired. That we are not so constituted is an evident fact, hence our bodies demand pretty constant repair as a companion action to that of work, labor, and duty. This process of repair consists in the reception of matter from the outer world, in the transformation of this matter into ourselves, and in its utilization in the work and repair of the frame. Such matter we shortly name food, and the processes whereby it is converted into our own bodily substance we term digestion.

SPIRIT RAPPINGS.—In August, 1847, great excitement at Rochester, N. Y., and surrounding country was caused by mysterious knocks, noises, and peculiar and strange demonstrations. The first appearance of these knockings was at Arcadia, Wayne County, N. Y. The family where they first made their appearance fled from the house, and it was afterward occupied by Mr. John Fox. His daughters were the first mediums through which this mysterious agency professed to communicate. The family removed to the city of Rochester, and the strange manifestations accompanied them. Very soon these strange proceedings were characterized by the name of "Spirit rappings," and numerous "mediums" were soon developed, and public lectures and private séances, where table-tipping and writing were introduced, were held. The subject attracted universal interest and attention, and within three years the followers of this new sensation numbered hundreds of thousands, with a force of 30,000 mediums. Several prominent persons publicly advocated the manifestations as communications from the "Spirit Land." Books were written, and hundreds of lecturers thronged the public platforms; private and *dark circles* and *séances* were held, to which, chiefly, the "demonstrations" were confined. From this origin has sprung the great and world-wide doctrine known as Modern Spiritualism. The sect claims millions of converts, scattered through all parts of the world.

THE MAN-TURTLE.—The following truthful description of the Man-Turtle is from Geo. M. Payne, of Wabash, Ind.: In the almshouse of Cass County, Michigan, is a most wonderful freak of nature. This human monstrosity has been the inmate of the poor-house for more than a quarter of a century. His parents

were fisherfolk. One day, while in a boat fishing, the mother allowed her fingers to touch the water; a huge turtle, attracted by the movements of the fingers, leaped through the water and bit them. The mother never fully recovered from her terror, and a few months afterward her child was born with the form of a turtle.

At first its resemblance to a turtle was not apparent, but became more and more visible as age increased. The first turtle-like action noticeable was its continual creeping long after it could walk. Upon examination it was found that the joints of the limbs were double, and turned outward like those of a turtle. As the horrible truth dawned upon the mother the child became loathsome to her, and the intense grief over her unfortunate child probably hastened her death, which occurred in a short time. The husband soon followed his wife, and the child was sent to the poor-house.

A gentleman who visited the poor-house states the following: "Passing through the lower story of the building I was ushered into a room in which the first object that met my gaze was Samuel Keene, the celebrated human Man-Turtle. Keene, at the command of the overseer, managed, with a side movement of the body, to take off his hat by means of his queerly-shaped claws, and to make a bow. We spoke to him, but the poor being had not enough of intelligence to give a sensible answer.

"As this human monstrosity stood before us bareheaded, he presented the most wonderful specimen of an amalgamation between the highest and one of the lowest classes of animals that can be imagined. In stature he is a dwarf, being about four feet in height, thick-set, with short limbs, hands turning outward the same as a turtle's, and instead of fingers the widened palms ending in webbed claws. The feet are fashioned in the same manner, and he walks with a sidelong, ambling gait peculiar to a tortoise. The inside of his claw was of a yellowish color, as, also, were his feet and stomach. The skin on the other portions had the same color and the same ribbed appearance as the under portion of a turtle. His back consists of tough layers of cuticle, which are becoming harder as he grows older. The most startling feature, however, is the head, which seems to be a continuation of the neck; it is pointed something like a snake's, and the face is flat. The back portion of the cranium is perpendicular to the neck and covered with short, bristly black hair. The rest of the body is hairless with the exception of a few long, black bristles around the mouth. The nose is like that of a full-blooded negro. The mouth extends from jowl to jowl and contains a full set of white teeth. The eyes are black and extremely large and rolling, having small pupils, looking directly ahead with a wild, staring, yet fascinating glare, very sharp and piercing, and fairly glisten beneath the broad eyebrows."

In his actions and talk he has a slow, measured, jerking style;

he is almost constantly moving his head, and his eyes are ever restless and snappish. He has a docile disposition, but is sullen, morose, and irascible when angered. He is not very sociable, scarcely ever speaks unless addressed, and when young never mingled with children nor engaged in juvenile sports.

His greatest delight is summer bathing, and he will remain under water for a very long time; he takes great pleasure with small children, also, and is especially fond of babies. He will eat anything set before him, but prefers vegetables, fish, and bread. During early childhood he was a constant care to his parents, as he was unable to feed himself, his claws, or fins, being too small to hold either spoon or knife.

He seemed to have no passions or affections, and cares no more for the female sex than for his own; he possesses but little emotion if any, and obeys a summons to a funeral of a fellow inmate as cheerfully as if it were a call to dinner.

He is now (1880) thirty years old, without a single idea of the world outside of the house and farm on which he has lived for the last twenty-seven years. It has been impossible to teach him anything but the few words which he hourly utters; he has no remembrance of dates or of incidents; he is ignorant of his age and everything connected with the past. All is blank; he exists only in the present, without a sorrow for the past or a thought of the future.

MESMERISM.—Mesmerism, or animal magnetism as it was formerly called, first excited public notice about the middle of the last century, when several persons in different parts of Europe conceived that men are sensible to its influence. Maximilian Hell, Professor of Astronomy at Vienna, advised (1773) a Baden physician of his acquaintance, Anton Mesmer—whence the name mesmerism—to try if he could not cure disease with the magnet. The Doctor, pleased with the idea, experimented actively, and finding that he could affect very singularly a number of his patients, laid claim to the discovery of a new remedial agent. Many sufferers were healed; popular attention was aroused on the subject, and Mesmer gained wide fame. A controversy arose between him and Hell, the former declaring that he did not cure his patients by mineral, but by animal magnetism, developed by his own body, and conducted to his patients with or without magnetism. The dispute waxed so fierce that Mesmer quitted Vienna for Paris, whence, as from the great centre of literature and science, he proposed to proclaim his new doctrines to the intellectual world. He caused great excitement there, became celebrated, and gained many converts, particularly among the higher classes. He published several works on his favorite topic, and they were very favorably received. Although the French Government refused to grant him a certain chateau, with adjoining lands, as a reward for his discovery, to

be employed as a great healing institute, it offered him an annual pension of 20,000 livres. He declined the offer, and complained of the nation's ingratitude. His followers and friends, desiring to compensate him for what he had done, proposed to form classes, which he should instruct in animal magnetism. By these classes he got 340,000 livres—nearly \$70,000—a vast sum for such a man in those days, and had among his pupils Lafayette, D'Esprenneuil, Puysegur, and Dr. d'Eslon, physician to the King's brother. The Government subsequently ordered the medical faculty to investigate Mesmer's theory, and a commission was appointed for the purpose, Benjamin Franklin, Lavoisier, Bailly, and Jussieu being among the members. Mesmer declined to appear before them; but they reported, after careful research and inquiry, adversely to his claims, deciding that the influence exercised was due mainly to the imagination. While his pupils adhered to him, the general voice proclaimed him a quack, and he was extinguished by it. He soon retired to Mörsburg (Baden), and died at an advanced age in total obscurity. Mesmer's animal magnetism was very unlike that of the present day. He usually treated his patients by placing magnets on different parts of their body, or ranging them around a covered tub, from which an iron rod went out to each person, the entire party touching hands. He also made passes with his hands on or near their bodies, causing nervous twitchings, drowsiness, sleep, sometimes cramp, convulsions, and alleviation of pain in those suffering from nervous disorders.

HYPNOTISM.—Some seven hundred medical students assembled in the lecture hall of the New York University Medical College January 28, 1881, and listened to a lecture on "Hypnotism," by Dr. William S. Hammond. Mesmerism has been in the hands of quacks and charlatans, said Dr. Hammond. For a long time there was an impression that animal magnetism had much to do with it, but that was one of the false ideas that had crept in through ignorance. I don't claim anything for mesmerism. I am simply testing it like many others. I think about two men in eight would prove good subjects, and about four women in the same number. Its influence is not confined to men and women; animals are liable to it, and make good subjects. I operated not long ago on a lot of crabs in Fulton Market. Frogs are capital subjects. You can take a frog and put him under this influence and turn him on his back. Now, of all the things in the world a frog dislikes it is being laid on his back. Well, when a frog is in this condition you might take a scissors, cut him open, and he will show no sign of the operation.

Dr. Hammond then experimented with a hen, putting her under the influence by holding her head for a few seconds so that her eyes rested on a piece of glass, and the hen rolled over and was insensible. After some further explanations Dr. Hammond introduced a human subject.

He brought forward Mr. Howley and sat him in a chair fronting the audience. He then held before the gentleman's eyes a small glass ball, and after a little delay the subject seemed to be completely absorbed in the contemplation of it. Turning again to the students Dr. Hammond said: "You see I begin in the way serpents charm birds. The serpents fasten their steely eyes on those of the birds and fascinate the poor things until they fall an easy prey. Now you will see in a minute how this young man will follow the ball wherever it goes." And so he did. Whichever way Dr. Hammond moved the ball the young man went after it. Nothing stopped him. Chairs, tables, doctors, stood in his way, but he stumbled over them or by them, and kept on after the ball with his eyes riveted on it as if his very life depended on his getting as near it as possible. Suddenly Dr. Hammond hid it and told him it was gone. He stopped, dazed, and looked as if he had lost something very precious. While he was in this state he was handed a bottle of soda-water and told it was a young lady. He took the bottle in his arms and immediately began to make love to it. He caressed it and said tenderly, "Will you have me? Do. I love you dearly. Oh, do have me." As he walked up and down Dr. Hammond took a lance and stuck the blade into the flesh of the young man's hand, telling him it was a bouquet, and the young man admired the imaginary flowers, showing no symptoms of pain. Suddenly he was told that the bottle was an old woman, seventy-five years of age, and he quickly dropped it, exclaiming, "I don't want to have anything to do with her." He ate lemon for strawberry, and asked for more; stripped off his coat and made a dash for a man he was told had called him a liar; waltzed, sang, cried, smelt water, and said it was "beautiful cologne," and proved himself an utterly pliant subject.

The next subject was Mr. David Wright, who accepted a book for a bird, and sang the "Sweet By-and-By" to it. When told it had escaped through the hall he made a rush for it among the students as if they had not been present. He made frantic efforts to climb a pillar and was furiously pursuing the bird when called back. He preached as an orthodox clergyman, then as a colored minister, changing his accent and his manner as quickly as the order was given to him, and did a number of other things, much to the amusement and astonishment of the audience. The next subject, a Mr. Wilson, acted Macbeth, reading the vision scene with good effect; preached, told funny stories, said he was Colonel Bob Ingersoll, repeating parts of that gentleman's lectures; got drunk on water, rolled in agony when told he was sick at the stomach, and created much merriment as a clown in a circus. Mr. Pritchitt, the last gentleman, stripped off all his clothes with lightning rapidity when told he was infested with rats. He delivered a lecture on electricity when told he was Benjamin Franklin. He stripped to fight at an

imaginary insult, rode a chair for a horse with the same seriousness and intensity he would a live equine. He became an organ-grinder, a ballet-dancer, a violinist, and numerous other characters. Dr. Hammond touched his nose with a cork and he roared with pain. The next instant he danced with delight at being assured that it was on again and in good condition. Dr. Hammond told him that his clothes were on fire, and he pulled them off, rushing almost nude to the opposite side of the amphitheatre. Dr. Hammond frequently put his fingers on the left temple of the different subjects and instantly arrested their power of speech; then he would touch the right temple and the subject resumed his discourse. At the close of the experiments, Dr. Hammond started two of the subjects going at the same time, and the result was most ludicrous. The lecture was a most interesting and entertaining one and occupied two hours in the delivery.

ARTIFICIAL ICE FACTORY.—The factory of the Georgia Ice Company, at Atlanta, has on the ground floor, a boiler 50 feet long and $4\frac{1}{2}$ feet in diameter, containing 150 feet of $3\frac{1}{2}$ -inch pipe. The boiler is kept filled with aqua ammonia, which is separated by the steam heat into ammonia, gas, and water. The gas, leaving the water in the boiler, forces its way through a 6-inch pipe outside the building to the roof, three stories up, where it passes into 15,000 feet of coiled pipes, in which it is converted into liquid by cold water thrown over it in fountain jets. This liquid passes into 15,000 feet of three-quarter inch pipe, arranged in vertical sections 30 feet high and 3 feet apart, and its sudden liberation into these pipes turns the liquid pure ammonia into vapor, and the sudden expansion makes the pipes intensely cold. Now, above these hundreds of vertical pipes are innumerable little fountain jets throwing spray all over the pipes, the spray freezing gradually, forming an immense icicle of pure ice around each pipe. The gas next goes into 15,000 feet of absorbing pipe, and, being cooled by water running on the pipes, it is met by water forced into the pipes, and thus converted back into aqua ammonia, which goes into the big boiler, and is used over again. There is no waste, the same ammonia being used and reabsorbed any number of times. The water used for the spray is drawn from a well 75 feet deep, on the premises, and the large blocks of ice (which are loosened from the pipes by a little hot steam) come out pure and clear, and entirely free from any odor or objectionable taste.

After the pipes have been stripped, about five weeks are required for a new lot of the requisite thickness to form. But, of course, the pipes are never all stripped at the same time, the ice towers being in all stages of formation. The factory has a capacity of 35 tons per day, but 20 tons keep pace with the demand, and it isn't stored, but cut every day as it is delivered, and it sells at from \$10 to \$12 per ton.

PULQUE—THE MEXICAN NATIONAL DRINK.—In a letter from Mexico to the *New York Sun*, the writer says: "This liquid is distilled from the maguey plant. It has a disagreeable smell and taste, but no description can possibly convey an adequate idea of its hurtful effects upon the prosperity of the country. In the first place, the most fertile and productive lands of the upper plain of Mexico are altogether given up to the production of the maguey plant. And when it is remembered that a maguey takes often years to come to perfection, and that very little attention is required in the meantime, it will be evident the employment this species of agriculture gives to the laboring class is far below that required for the cultivation of any kind of grain. Yet it is by this very class of persons that pulque is most drank, and consequently the reals of the workingman find their way into the pockets of the rich owners of haciendas who spend their profits in Paris or Brussels, while the working people receive no substantial benefit from the principal agricultural pursuit of the country. Besides, the effect of pulque drinking is horribly enervating and demoralizing. Taken in moderation it is an excellent tonic to the stomach; but taken in excess the effect is fearful, as it produces the worst kind of intoxication. I have never seen so many drunken people as in the City of Mexico, where the 'pulquerias' are more frequent than gin palaces in London, or gin mills in the Bowery. A pulque drunk lasts about twenty-four hours, and as one plant produces every day about four quarts, just about enough to intoxicate a pulque drinker, and this plant lasts for six months or more, the owner of a small plot of ground can remain half drunk, as indeed many of them do, for many years. The enormous amount of liquor that is consumed yearly can be estimated from the fact that in the City of Mexico alone the consumption is at the rate of a pint a day for every inhabitant, and that a special pulque train runs twice a day between Apam, a village in the heart of the maguey district, and Mexico City, the freight from pulque on each train amounting to seven hundred and eight hundred dollars.

"The maguey yields another liquor, which is not so deleterious in its effects as a drink or as an object of labor as is pulque. This is the vino mezeal, which is a species of brandy distilled from the juice of the maguey; and it is not unlike Jamaica rum. It is manufactured in large quantities at Apam, where the dry and cold temperature of the great Mexican plain produces the maguey in its highest perfection. At Tequila, a little town in the State of Jalisco, to the north of Guadalajara, a very superior kind of mezeal is manufactured, which takes its name from the town, and is really a very palatable beverage. But, in spite of the usefulness of the maguey, supplying as it does, fruit, drink, yarn, hemp, paper, needles, and brushes, it is one of the banes of this favored land."

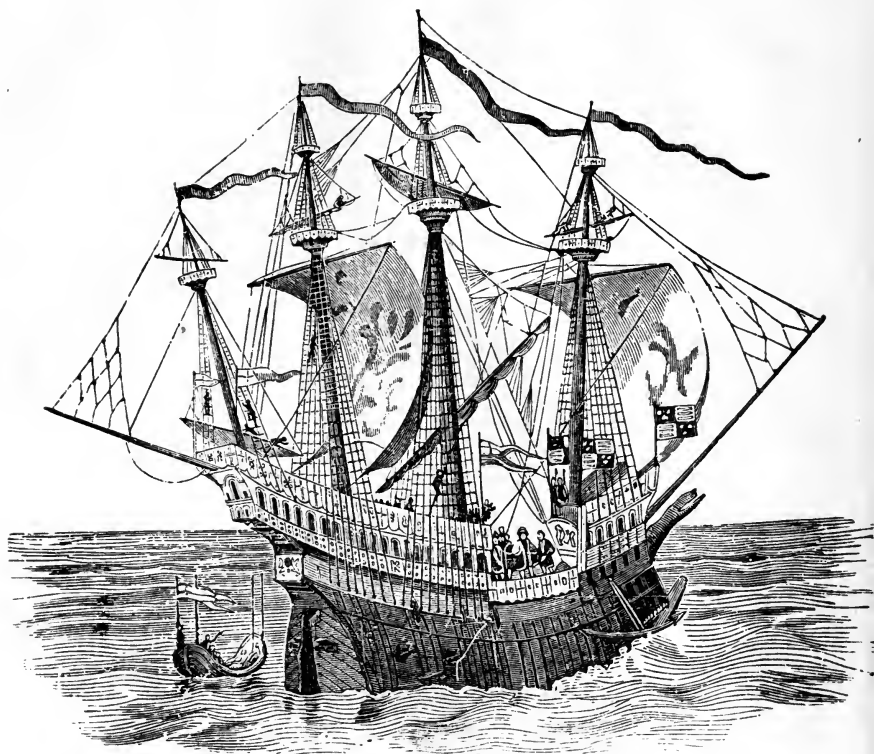
CELLULOID.—Celluloid, one of the most remarkable of modern inventions, bids fair to be not less extensively or variously used than vulcanized rubber. It is produced by mixing gum-camphor with gun-cotton, and subjecting the combination to a high test of pressure and heat. The result is a hard product of extraordinary toughness and elasticity. It can be made plastic again and moulded in any required form. Any color can be given to it by the use of coloring matter during the process of manufacture. It is extensively used as a substitute for ivory, which it resembles so closely that it is sometimes difficult to detect the difference. It is said to equal ivory in strength and elasticity. It has proved a good material for piano and organ keys, backs of brushes, looking-glass frames, handles for knives, forks, umbrellas, and many other articles. It is much cheaper than ivory. It is also used with much success to imitate tortoise-shell, malachite, amber, pink coral, and other costly materials. In imitation of tortoise-shell, it is made into combs, napkin-rings, match-boxes and card-cases. Imitations of pink coral jewelry are made and sold at prices much below those of the genuine. It is also used as a substitute for porcelain in making dolls' heads. The frames of eye-glasses, opera-glasses and spectacles are made of it. More recently it has come into use in combination with linen, cotton or paper, for shirt bosoms, cuffs and collars. The material has a hard, glistening surface, like that of newly laundried linen.

PETROLEUM, OR ROCK OIL.—This is a liquid, inflammable substance, including benzole, naphtha, paraffine, asphaltum, and various other articles. From time immemorial it has been found on the borders of the Caspian Sea, and to a limited extent it has been used for illuminating purposes. It has also been found in Burmah, Trinidad, Canada, and the United States. It was used by Indians as a medicament in different parts of New York and Pennsylvania; they found it floating on the surface of some of the streams flowing into the large rivers. It was first distilled at Pittsburg, in 1850, and about that time used for illuminating. It was in 1859 that the first successful boring was made, at Oil Creek, and shortly after the wells yielded about 1,000 barrels a day. Soon after it was found to richly repay well-sinking in Ohio, Virginia, and other States. Before many years millions after millions of barrels were brought to the surface. Chemists assert that the oil is the proceeds of animal bodies crushed in the subterraneous recesses of the earth, and their arguments seem to prove this theory. U. S. surgeons have found it very effectual in curing gangrenous wounds. It has also many other valuable curative properties. In 1880 it was found in large quantities in Russian territory, and extensive works have been constructed to raise it and transport it to different parts of that empire. It now (1881) counts



JOHN GUTENBERG.

THE INVENTOR OF PRINTING.



THE SHIP GREAT HARRY.

THE GREAT HARRY was the ship in which Henry VIII. sailed to France to meet Francis I. on the memorable occasion of the "Field of the Cloth of Gold."

This picture represents Henry on board a large four-masted ship, with two round-tops on each mast. The King is standing on the main deck with attendants. The sails and pennants of the ship are of cloth of gold; the royal standard is flying on the four corners of the forecastle; and the arms of England and France are depicted on the front of the forecastle, and also on the ship's stern. Our engraving is copied from a large picture in the Naval Gallery at Greenwich, England. The form of the ship seems very uncouth to those who are accustomed to the beautiful models of our modern sailing vessels—so elegant in form, so compact in structure, and so well fitted to encounter the storms and squalls of long voyages. Nevertheless the Great Harry was a wonder in her time, and is mentioned with much laudation by the writers of that early period in the Naval History of England.

The Great Harry was rated at 1000 tons, and is set down as having 122 guns, but only 34 of these were such as would now be admitted into the rank of guns; the rest were pieces of small calibre, the largest deserving no higher name than swivels, and all of them distributed about, so as to make it a very harmless but fierce-looking vessel. But though the Great Harry was the wonder and admiration of its day, it was but a fair-weather vessel, fitted only to make people stare, and to be the centre of a holiday picture. It was ill adapted to stand a rolling sea or a gale of wind; while a broadside from a modern ship of war might have sent it plunging to the bottom. Doubtless the then watermen of the old school often shook their heads at the theoretical folly of attempting to build a ship so high out of water; and as they passed it in their shallops, pulled rapidly away, lest the great tottering thing should fall over on them. It was but little used; lasted for thirty-eight years, and was accidentally burned at Woolwich, in 1553.

in value among the four or five articles exported from the United States.

BENZINE.—Among the many discoveries of the last quarter of a century, is that of a method of extracting this useful article by compression from coal-gas. It is a brilliant, colorless liquid, and smells strongly of coal-gas. It boils at 176 deg., and is very inflammable. It is extensively used in the arts, having the property of dissolving India rubber, gutta percha, wax, camphor, and fat. From it is also produced *aniline*, the basis of many very beautiful dyes. It is also extensively used in perfumery, under the name of *essence of mirbane*. Formerly the material which is the basis of all these valuable products, was not only useless, but pernicious, and gas manufactories had much difficulty in getting rid of it.

CHAP. XC.

MISCELLANEOUS CURIOSITIES.—(*Continued.*)

The First Steamboat—Steamship “Great Eastern”—Ship “Great Harry”—Pacific Railroad—Great Trestle Bridge on Pacific R.R.—Great Sutro Tunnel—Flying Machine—Discovery of Gold.

FULTON'S STEAMBOAT.—*The first successful steamboat* was built by Robert Fulton, a native of Pennsylvania, and called the *Clermont*. Mr. Fulton made his trial trip on the Hudson River, from New York to Albany, and thousands of curious spectators thronged the shores to witness the failure of “Fulton the Fanatic.” None believed, few hoped, and everybody jeered. An old Quaker accosted a young man who had taken passage, in this manner: “*John, will thee risk thy life in such a concern? I tell thee she is the most fearful wild-fowl living, and thy father ought to restrain thee.*” But, on Friday morning, the 4th of August, 1807, the *Clermont* left the wharf, and went puffing up the Hudson with every berth, twelve in number, engaged to Albany. The fare was seven dollars. Fulton stood upon the deck and viewed the motley and jeering crowd upon the shore, with silent satisfaction. As she got fairly under way and moved majestically up the stream, there arose a deafening hurrah from ten thousand throats. The passengers returned the cheer, but Fulton, with flashing eyes and manly bearing, remained speechless. He felt this to be his long-sought hour of triumph. They were cheered all along the passage from every

hamlet and town, and at West Point the whole garrison were out and cheered most lustily. At Newburg, the whole surrounding country had gathered, and the side-hill city swarmed with curious and excited multitudes. The boat reached Albany safely—150 miles in 32 hours, and returned in 30. The *Clermont* was a success, and Robert Fulton was famous.

THE STEAMSHIP "GREAT EASTERN."—June 28, 1860, arrived at New York the English iron steamship *Great Eastern*, J. V. Hall, commander, being the largest vessel ever constructed since "Noah's Ark"; it was capable of carrying 10,000 soldiers, besides her crew of 400. Her arrival had been expected, and great interest and excitement was caused upon the announcement. The wharves, buildings, adjoining streets, and, indeed, every available spot which afforded a view of the mammoth steamer, was densely crowded with anxious spectators. The harbor and river were alive with all manner of craft to get a near view of the great and wonderful, world-renowned ship.

The passage over the bar, which was considered a very critical undertaking, was conducted by Mr. Murphy, who silently, with a simple wave of the hand, indicating to the helmsman the course to be pursued, safely and skillfully guided this huge monster of the waves over the dangerous bar and into the North River. Grandly and proudly she moved amid a sea of sails, gay with banners and streaming pennants, like a mighty leviathan in the midst of a school of flying fish. The booming of cannon, ringing of bells, and the shrill shrieking of hundreds of steam-whistles, together with the music of brass bands, and the chimes of Trinity Church playing "Rule Britannia," altogether made a scene long to be remembered by those who witnessed it. For many weeks after her arrival the *Great Eastern* was visited by tens of thousands, who were eager to inspect the marvellous structure. Her length was 680 feet, and she was of about 20,000 tons burden; 10,000 tons of iron were used in constructing her hull. The force used in moving the machinery of this immense ship would drive forty of the largest cotton mills, which give employment to over 30,000 operatives. The *Great Eastern* was used for laying the Atlantic cable, and proved to be of indispensable value.

THE PACIFIC RAILROAD.—The completion of the Great Pacific Railroad May 10, 1869, was the grandest event of the nineteenth century. Its length, exclusive of branches, is over 2,000 miles, and crosses nine distinct mountain ranges, which are tunneled in several places; also, many wonderful bridges were built, spanning chasms of fearful and precipitous depth. This great enterprise was begun in 1862, and completed in 1869. It was built by two separate companies; the eastern portion by the Union Pacific Company, which built the road to Ogden, and

the western part by the Central Pacific Company, which built it from San Francisco to that point. As the distance between them grew shorter, the competition and excitement grew more intense. About 25,000 men and 6,000 teams were employed along the route, and as they neared the point of junction every nerve was stretched, and the excitement almost equaled in intensity a race between continental giants. The eyes of the whole continent were fixed upon them, and their daily progress was reported over the wires, until, when the eventful 10th of May arrived, and the last rail was laid, and the last spike driven, thousands of anxious listeners were waiting at each end of the route for the signal when the last blow should be struck. There they stood, and could the wonderful telephone have had a development sufficient to have reverberated the sounds of the falling hammer, the picture would have been complete. But in their ignorance of this amazing and subsequent stride of science, they attached the wires to the last rail, that each blow of the sledge should be recorded on every connecting telegraph instrument between San Francisco and Portland, Me. Indeed, from Boston to New Orleans the wires were held in readiness to receive not only the message "done," but the very echo or vibration from the falling hammer. In San Francisco a telegraph wire was attached to a fifteen-inch gun; also to all the fire-bells in the city, which were rung simultaneously with the firing of the gun by electricity. All business in the city was suspended, and all classes united in a grand celebration. All over the State of California the excitement was at fever heat. In New York and Washington the interest was intense. Chicago celebrated the event on a magnificent scale; the procession was very unique, and was over four miles long. The road from Omaha to San Francisco cost \$165,000,000, and required 110,000 tons of iron rails, 1,000,000 fish plates, 2,000,000 bolts, 15,000,000 spikes, 3,500,000 cross-ties, besides millions of feet of timber not estimated, for the construction of bridges, culverts, and roads. By means of this wonderful highway the distance from New York, to San Francisco was reduced to seven days' travel; from New York to Japan twenty-five days.

TRESTLE BRIDGE ON THE PACIFIC RAILROAD.—Wooden bridges have taken a high rank in modern engineering, and for boldness in their planning, united with mechanical simplicity and perfection, the United States enjoys the highest reputation. The traveler, the first time that he passes over them, feels a thrilling sensation of peril as he shudderingly gazes down into the abysses below. The following description will give a very good general idea of their construction. Spanning Dale Creek, a mountain stream near Sherman, is a trestle bridge 650 feet from one rocky bluff to another. High, light, and airy, 126 feet above the stream, it looks light as fairy frost-work, but its strength is enormous.

Not a single bit of the timber used in this bridge but what is at least twelve inches in diameter. The supporting pillars are banded together with ingeniously contrived iron plates. Another wooden trestle bridge is at a place that, from its gloomy character, has been named the Devil's Gate. This is about ten miles from Salt Lake, where the Weber River rushes down a chasm in the Rocky Mountains. On the first opening of this bridge, the train passed over on a trestle bridge seventy-eight feet above the furious stream. A Government inspector thus reported of the spot: "Should a train go down into this fearful gulf all who escaped being crushed would inevitably be drowned." The bridge is a double trestle, one resting on the other, "the supporting timbers standing at an angle of about forty degrees, gradually narrowing from the base to the top. The upper timbers, among other means adopted to prevent their giving way, are secured by large ropes tied around them, and fastened to projecting rocks above." Good trestle-work is supposed to last from fifteen to twenty years, and for viaducts it is ascertained to be much cheaper than embankments. Among famous trestle-bridges may be here mentioned that at Pittsburg, 1,172 feet long; the Portage Bridge on the Erie Railroad, 800 feet long, and so constructed that a single timber could be taken out, if needed.

THE GREAT SUTRO TUNNEL.—As this wonderful engineering feat is accomplished, we give a few facts relating to it. This tunnel is intended to render easy the work of mining in the Comstock lode, which had become unprofitably expensive. The mines had reached a depth of over 2,000 feet, and the yearly expense of getting rid of the water, reached nearly \$3,000,000. Added to the expense was the fact that the temperature of the lower depths had become almost unendurable. The object of the tunnel from the side of the hill was to tap the mines some 1,800 feet from the opening of the shafts, thus allowing the mines to be drained by natural flowage, and at the same time the heat would be lessened through the ventilation thus obtained. The ore would also be removed by this tunnel. The work has occupied about ten years, and has cost all of \$3,000,000.

FLYING-MACHINE.—In the year 1833 a model flying-machine was constructed by Rufus Porter, of New Britain, Conn., who kept experimenting, until about fourteen years later he produced a model propelled by steam, which he exhibited at Washington and at the Merchants' Exchange, New York, and a journal of the day declared "it made the circuit of the rotunda eleven times like a thing animated with life." Still later he constructed a full working machine, but which he never completed because it was found impossible to procure a varnish or coating for the canvas covering which would prevent the leakage of the gases

to an extent that wholly destroyed the lifting power of the balloon. The balloon was cigar-shaped, and a little below was suspended a car, conforming on a small scale to the shape of the balloon, which carried the motive power for propelling the whole, and was provided with a pair of screw propellers and a four-leaved rudder. In 1869 Mr. Porter's principle was revived, with certain additions, at Shell Mound Lake, Cal., by Frederick Marriot, and operated by a small steam-engine. The apparatus worked well in a still atmosphere, but proved a failure in brisk winds.

THE DISCOVERY OF GOLD IN CALIFORNIA.—In May, 1848, gold was discovered in California, at Sutter's Mill, near Sacramento, by James Marshall. The news soon spread over the State, and great excitement prevailed. All classes rushed to the mines. Ships were deserted by their crews. Soon the whole world was electrified by the report that a new Golconda had been discovered. Thousands rushed to the new gold fields from every State and from almost every civilized country. In a little over a year California had a sufficient number of inhabitants to entitle its admission as a State. The city of San Francisco grew up like "Jonah's Gourd." Its streets were soon thronged with daring and reckless adventurers from all parts of the world. Gambling became the daily pastime of the idle and the successful miners, and murder was of almost daily occurrence. Vigilance committees were appointed, and for five years justice was administered in this manner with telling effect. In 1856 law and order was established, and for many years California flourished, and was the great El Dorado of the West in point of mineral wealth, agriculture, and general prosperity.

CHAP. XCI.

MISCELLANEOUS CURIOSITIES—(*Continued*).

New Mode of Telegraphy—The Telephone—The Photophone—The Phonograph—Electric Light—Elevated Railroads—Great Suspension Bridge, N. Y. City—Central Park, N. Y. City—Egyptian Obelisk (Cleopatra's Needle) Central Park, N. Y. City—Mammoth Cave, Kentucky—Hot Springs of Arkansas.

A NEW MODE OF OPTIC TELEGRAPHY.—The use of intermittent luminous signals in ships, lighthouses, etc., is now very general; and the common method is that of bringing a movable diaphragm before a steady source of light. Thus the light is not utilized during eclipse, and it has been estimated that in ordinary systems 65 per cent. of the light is lost (in light-houses

sometimes 90 per cent.) M. Mercadier has lately proposed a new plan, the essence of which lies in varying the source of light, making it flash up to its maximum at one moment, and reducing or extinguishing it at another. This can be done either by promptly varying a supply of oxygen to a low flame, or by varying the supply of combustible gas. M. Mercadier describes an arrangement of the former kind, in which he uses a simple petroleum lamp of M. Duboscq; it has a round wick (which does not pass beyond the containing cylinder), and in the center rises a thin vertical tube, debouching a little below the plane of the wick. This tube admits the oxygen coming from a reservoir. The mode of admission is by pressure with the finger on a key, like that of a Morse apparatus; this has the effect of momentarily releasing a caoutchouc tube (by which the oxygen is conveyed) from the pressure of a clip. The flame then brightens. On taking the finger off, the supply of oxygen is stopped again, and the flame is reduced to very small size. This system, M. Mercadier says, has been adapted to apparatuses of optical telegraphy, and has given good results. He will shortly indicate how the same problem is solved with the electric light.

THE TELEPHONE; OR, ARTICULATING TELEGRAPH.—In 1876 the first working instrument of this nature was introduced to the public. Its real merits were shown and fully proven before a large audience, by Prof. Graham Bell, in the Boston Music Hall, where communication was had with Providence, forty-five miles away. It is now (1881) in practical and successful operation over millions of miles, both in this and many foreign countries. The Bell telephone conveys plain articulate speech many hundred miles on telegraph wires. The British Government, which has for some years added the whole electric telegraph to their Post-Office system, have now added the Bell telephone to that organization. It is one of the most important and useful of human inventions.

THE PHOTOPHONE.—This remarkable invention is own sister to the telephone. It means, to talk by light. The idea upon which it is founded is this:

Certain substances are sensitive to light, and change their electrical condition according to the amount of light that falls upon them. To understand this, you may observe that colored cloths fade in the sun, and certain chemicals change their color in a beam of light, as in taking a photograph. This is called the actinic effect of light. This is a new fact in nature, and upon it is founded the new apparatus for talking by light.

The apparatus consists, first, of a transmitter for causing the sound of the voice to affect a beam of sunlight. This is a thin diaphragm of silvered mica arranged somewhat like a diaphragm of a telephone. A powerful beam of sunlight is directed upon the

front of this, and is reflected through two lenses to the receiving-station, which may be several hundred feet, or metres, away. The operator stands behind the mirror, and speaks against the back of it. At the receiving-station is a reflector arranged to receive the beam of light and concentrate it upon a curious substance discovered a few years ago, and called celenium, and connected in a peculiar manner with a telephone.

Now, if the operator speaks behind the mica mirror, the person holding the telephone to his ear hears every word that is said. To trace the curious changes the sound goes through, from one operator to the other, we must observe that the vibrations of the air move the mirror, and cause the beam of reflected light to vibrate. The vibrations of the light affect the electrical condition of the telephone; the electrical vibrations are transformed in the telephone back again into sounds. This truly wonderful invention is so new that it is impossible to say what may result from it. This much has, however, been proved: the sound of the human voice and musical notes may be sent to a distance by means of a beam of sunlight or by the light of a lamp.

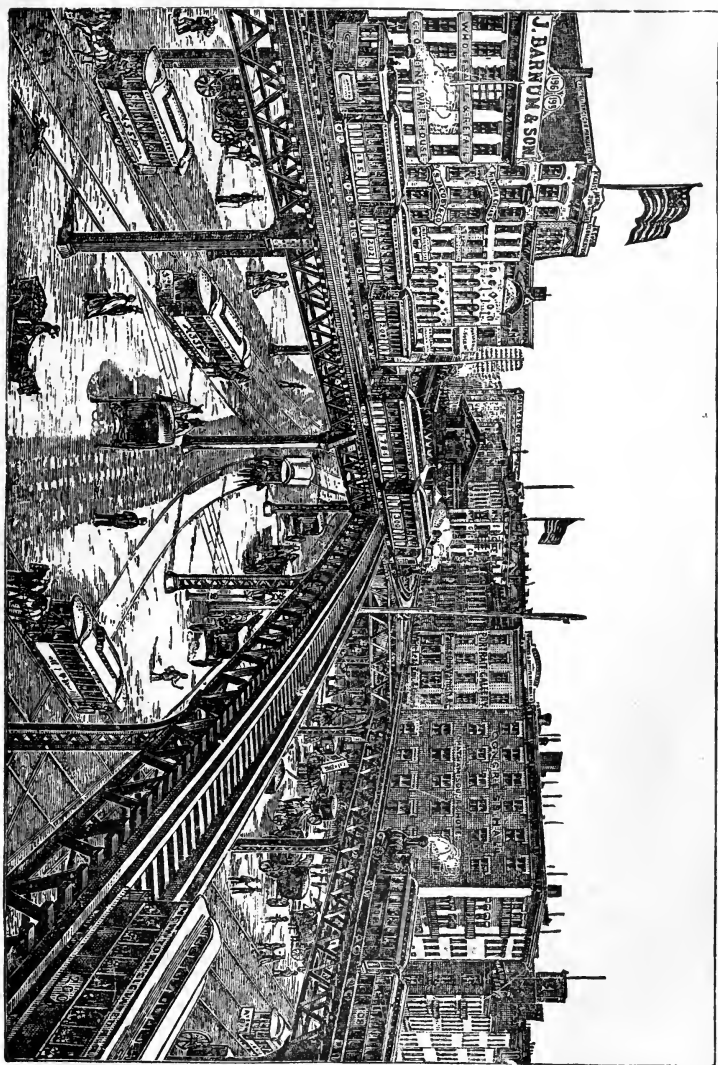
EDISON'S PHONOGRAPH.—The phonograph, or sound-recorder, is a device for permanently recording and faithfully reproducing at any time or place all kinds of sounds, including those of the human voice. The speaking phonograph was invented by Mr. Thomas A. Edison, and is a purely mechanical invention, no electricity being used. It is, however, somewhat allied to the telephone, in consequence of the fact that, like the latter, its action depends upon the vibratory motions of a metallic diaphragm, capable of receiving from and transmitting to the air sound vibrations. When a person speaks into the mouth-piece of the instrument, which will cause the diaphragm to vibrate, and as the vibrations of the latter correspond with the movements of the air producing them, soft and yielding tinfoil will become marked along the line of the groove by a series of indentations of different depths, produced by a peculiar mechanical combination, varying with the amplitude of the vibrations of the diaphragm, or, in other words, with the inflections or modulations of the speaker's voice. These inflections may therefore be looked upon as a sort of visible speech, which, in fact, they really are. If, now, the diaphragm is removed, and a cylinder turned, we have only to replace the diaphragm and turn in the same direction as at first to hear repeated all that has been spoken into the mouth-piece of the apparatus. A stylus by this means being caused to traverse its former path, and consequently rising and falling with the depressions in the foil, its motion is communicated to the diaphragm, and thence through the intervening air to the ear, where the sensation of sound is produced.

ELECTRIC LIGHT.—Since 1877 the subject of utilizing the recently discovered powers of electricity as an illuminating agent,

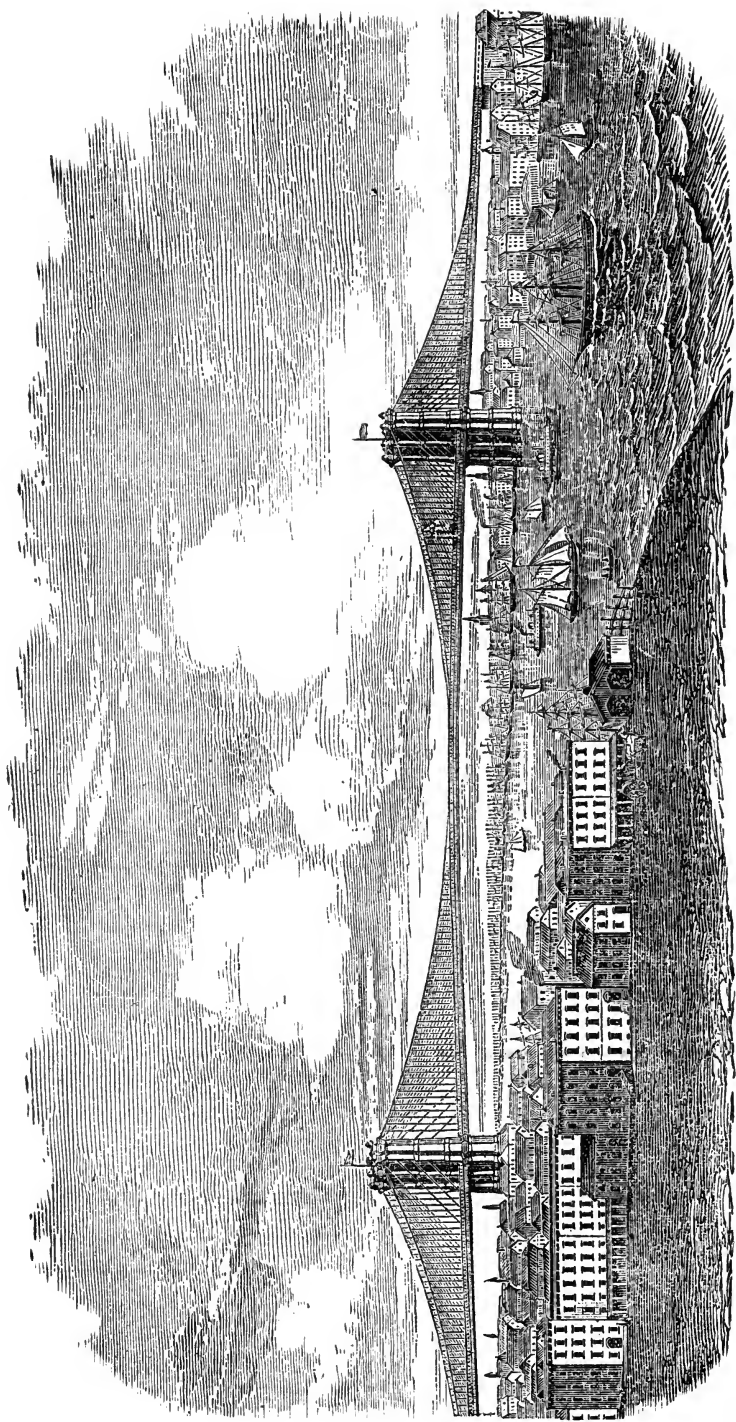
has occupied the attention and employed the skillful manipulation of leading inventors and other scientists. M. Jablochhoff, an eminent Russian, has received the credit of first producing a very much simplified form of lamp, in which, without using mechanical contrivances in the nature of clock-work, it is entirely possible to manage a number of lights, so far separate in their action that the going out of one of the lamps will not cause the rest to become extinct. This particular kind of lamp or candle, as it is sometimes termed, is produced by two rods of gas carbon, kept side by side by an asbestos holder, but slightly separated by a slight rod of some insulator, as glass or krolin. Copper tubes hold the carbons, and connected copper wires lead the current from the dynamo-electric machine used to produce the power. The ingenious and delicate mechanism would require plans to give a non-scientist a proper idea of the operation. Edison and other eminent electricians have patents covering the same results by many different methods. Many public buildings, including that vast edifice, the New York Post-Office, and a number of streets and private buildings in New York City, are brilliantly illuminated by this process. It has been found in practice admirably fitted for the illumination of the lofty lanterns of light-houses, and for the flashing of signals to and from forts and other beleaguered places. It has also the valuable property of being used to light up the depths of the sea. (See page 793).

ELEVATED RAILROADS.—The first of these roads built in New York City was known as the Ninth Avenue Road. At first it was a good deal ridiculed, but improvement succeeded improvement, until its utility became acknowledged. It starts from Whitehall Street and runs through Greenwich Street and Ninth Avenue to Fifty-third Street, where it joins the Metropolitan (Sixth Avenue) road. This latter road also starts from Whitehall Street, and running within a block or two of Broadway reaches the Sixth Avenue, along which it continues until it reaches Fifty-ninth Street. It makes over two detours to gain Eighth and Ninth Avenues, and continues on to the Harlem River. On the east side of the city the Third and Second Avenue Roads run from the Battery and City Hall, and by transfer enable their passengers to reach different parts of Harlem River. These roads, notwithstanding they were very speedily erected, were strongly built, and are well equipped.

In the construction of the elevated railroads the combination of solidity and lightness was an important object, and it is believed that in each case the problem has been satisfactorily solved. The foundation for the supports are laid in concrete, stone, and brick-work. Four long rods pass up through the heavy foundation-stones, and around these is built up the brick-work, inclining gradually inward from the base to the top. The



ELEVATED RAILROAD, NEW YORK CITY—VIEW AT CHATHAM SQUARE.



BROOKLYN.

GREAT SUSPENSION BRIDGE CONNECTING NEW YORK CITY AND BROOKLYN.

NEW YORK

rods extend several inches above the brick-work, and fit into holes at the four corners of the heavy iron castings in which are the sockets for the reception of the supporting columns. The castings are secured to the rods by means of screw nuts. The columns, light in appearance, are calculated to bear a strain more than double that to which they will be subjected, so that the margin of safety is large. The columns are connected and strengthened by longitudinal and transverse bracings of iron. These in their turn aid in supporting the roadway of parallel iron bars. Across these bars are fastened the wooden ties, upon which are affixed the rails. The latter are very heavy and of best quality. On both sides of each rail are strongly fastened heavy parallel timbers to prevent derailment. The engines and cars are so constructed as to admit of curves in the track with a radius of ninety feet; and for greater safety the outer rail on all curves is raised six inches.

Some idea of the enormous business done on the New York elevated roads may be had by perusing the statistics of the Metropolitan "L" road on Sixth Avenue for one year. This road having been run on 313 week days, being closed on Sundays, 15,060,401 passengers, or on an average of 50,000 per day. For one month the average was 52,803 per day. The receipts, as verified, were \$1,213,845.52, or about \$4,000 per day, the average being \$4,200. The fifteen million passengers have, on an average, paid eight cents fare. Had the road been running on Sundays over 2,000,000 more passengers, or 17,000,000 in all, would have been carried, and the receipts would have been \$200,000 heavier. This little piece of road is only four and a half miles in length, and it is remarkable that \$1,250,000 should have been paid in twelve months. On this short road the trains have run 1,327,994 miles. Out of the fifteen million passengers carried not one has been killed or injured through any fault of the road. Estimating the saving of time effected by each of these fifteen million passengers, the total grows into something enormous.

THE EAST RIVER SUSPENSION BRIDGE.—This enormous structure, the foundations of which were laid in 1870, connects the cities of New York and Brooklyn. It far surpasses in all the elements of greatness any similar erection. The central span is the widest in the world, and its height is so great that the largest ship afloat can pass under without striking her standing spars. The piers on the banks of either shore are truly colossal. The approaches on each side are vast viaducts of brick and granite. We give the principal dimensions of the different portions of the bridge: Single span across the waterway, 1,595 feet; four cables for sustaining the road, each cable consists of 5,434 steel wires; strength of each cable, 11,200 tons. Approach on New York side, 2,492½ feet; ap

proach on Brooklyn side, 1,901 feet. Total length, 5,989 feet. Size of towers, at high-water line, 140x59 feet. Total height of towers, 277 feet; from high-water to roadway, 120 feet; high-water to centre of span, 135 feet; from roadway to top, 158 feet; width of bridge, 85 feet. There are tracks for steam cars, roadways for carriages, and walks for foot-passengers, and an elevated promenade commanding a view of extraordinary beauty and extent. The total cost of construction will be very little short of \$13,000,000, including money paid for land, houses demolished, etc. It has taken ten years to build it, from 1870 to 1881. The designer was J. R. Roebling.

NEW YORK CENTRAL PARK.—This magnificent pleasure-ground equals any and surpasses most of a like nature. It covers eight hundred and forty-three acres. It is bounded by Fifth Avenue, 110th Street, Eighth Avenue and Fifty-ninth Street. The various reservoirs, lakes, and ponds cover about one hundred and eighty acres. There are some ten miles of carriage roads, about five and one-half miles of bridle paths, and twenty-seven and one-half miles of walks. There are very fine collections of animals and birds about a building known as the Arsenal. The large lakes have many fine row-boats upon them. The Park has cost many millions, but never has money been more righteously expended; for here the people receive back at least some of the taxes that they have paid. The bridle paths for visitors on horseback pass through many beautiful and secluded glades and over breezy hills. The best way, however, of seeing the Park is to walk through it. There are many very fine bridges in brick and stone, and some rustic ones in wood. The Mall is a noble walk, beneath overarching trees. There are large reaches of meadow laid out for play-grounds. Statues of Shakespeare, Scott, Halleck, Burns, and a bust of Schiller. Several excellent groups in bronze also adorn the Central Park. The Belvidere, a high tower in the Gothic style, affords a noble outlook; while a gloomy cave gives a romantic cast to the gloomy glades that lead to it. Central Park owes its success in a great measure to the gratuitous exertions and admirable taste of August Belmont, the famous banker, and Gen. Strong, an equally well-known business merchant, both leading citizens of New York.

THE EGYPTIAN OBELISK (CLEOPATRA'S NEEDLE) IN NEW YORK CENTRAL PARK.—At noon on the 22d of January, 1881, the huge monolith (single stone) from the banks of the Nile was lowered to its final resting-place on the knoll in Central Park. Lieutenant-Commander Gorrings's face was lighted up with smiles at the accomplishment of his arduous enterprise as the Needle of Egypt swung into position and settled into its bed. About 11 o'clock all the officers of the Navy Yard and a strong force of sailors and marines, numbering over 300, were present.

After defiling through the Eighty-second Street entrance and

reaching the foot of the knoll on which the monolith was to be erected, the guard of honor halted, the sailors forming one side of a square on the east, and the marines on the north. Lieutenant-Commander Gorringe then gave directions to knock away all encumbrances, and be ready for lowering. A few minutes later a carriage drove up, and Secretary William M. Evarts and General Goff, the new Secretary of the Navy, alighted. The sailors and marines presented arms, and the drums rolled and the band played. Fronting the obelisk were many Masonic dignitaries.

Over 5,000 people lined the snow-covered sides of the Knoll. At high noon Lieutenant-Commander Gorringe waved his handkerchief, down fell light supports and scaffolding, and the colossal stone revolved majestically on the apparatus to which it was attached. When the point swung round until it became vertical, and the base hung over the socket prepared for it, everybody cheered, the band struck up "Hail Columbia," and the marines and sailors again presented arms.

Less than five minutes sufficed to fix this stupendous yet delicate piece of work. The stranger from the burning sands of Egypt had taken up permanent quarters on a hill in the New World.

The following figures will be found interesting :

Height of the obelisk from base to tip, 69 feet 2 inches.

Base of the obelisk, square through its axis, 7 feet $8\frac{1}{2}$ inches ; at the top, 5 feet 3 inches.

Weight, 219 $\frac{1}{2}$ tons.

Main body of the obelisk, 61 feet 7 inches in length.

Pyramidon, 7 feet 7 inches in length.

No two sides of the obelisk are equal in width. If it is cut through in sections it will be found to be a trapezium.

The height of the pedestal is 6 feet 11 inches ; at the base it is 9 feet 3 inches square, and at the top 9 feet 1 inch square.

The weight of the pedestal is 49 tons.

The height of the foundation is 4 feet 10 inches.

Height of the bottom step, 1 foot $5\frac{1}{2}$ inches ; width, 1 foot 6 inches.

Height of the middle step, 1 foot 7 inches ; width, 1 foot $2\frac{1}{2}$ inches.

Height of top step, 1 foot $9\frac{1}{2}$ inches.

The base is 17 feet 8 inches square at the bottom, and 12 feet $3\frac{1}{2}$ inches as the top.

Its weight is 87 $\frac{1}{2}$ tons.

Total height of the tip of the obelisk from the monticle on which the base stands, 80 feet 11 inches.

Height from the eastern drive to the foundation, 12 feet 1 inch.

Elevation of the site of the obelisk above mean high water 101 feet 6 inches ; to the top of the obelisk, 194 feet 6 inches.

Weight of the obelisk and its pedestal and foundation, 712,000 pounds.

According to the best authorities 3,746 years intervened between the first erection of the obelisk and its removal to New York. Its builder, Thotmes III., is said to be identical with the Pharaoh who persecuted the Jews and was afterward overwhelmed with his host in the waters of the Red Sea. During the existence of this latest ornament to Central Park, 125 generations have walked over the surface of the globe, and its figured shaft recalls the days when Moses and Aaron stood before the king and commanded him to allow Israel to depart.

This obelisk was presented to the City of New York by the ex-Khédive of Egypt, and the work of bringing it home was given to Lieutenant-Commander H. H. Gorringer, of the United States Navy. The express charges were paid by a wealthy New Yorker, believed to be Mr. William H. Vanderbilt. The machinery for moving the stone was all made in this country. It consists of a pair of iron trunnions and a pair of steel derricks. The stone was carried overland seven miles to the Government dock at Alexandria, and was put in the hold of the steamship *Dessoug*, a vessel of 1,600 tons. The vessel reached New York City July 20, 1880. The work of moving it across the city was done skillfully. (See page 571).

MAMMOTH CAVE OF KENTUCKY.—It is like trying to describe the indescribable to give any full idea of this the most extensive cavern in the world. Think of a subterranean city 400 feet under the surface, full of monuments, theaters, temples, domes, minarets, and every device of architecture that skill could frame and taste adorn. Imagine the streets extending among towering buildings for a hundred miles. A hush as silent as the tomb prevails. Black, mysterious rivers, full of sightless fish, crawl darkly through the ebon caverns, while the exhalations of their silent tide cluster on roof and wall, and garland them with ornaments of cusp and alabaster. It would take too much space to attempt anything like a detail of this extraordinary place. At places are narrow chasms that admit the explorer with great difficulty; at other places the way grows wide, and the eyes are greeted with vast domes, from which are suspended huge chandelier-like forms, like purest alabaster; grand chambers that far excel in size and beauty the famed hall of Westminster; while in other places you see *fac-similes* of great Gothic cathedrals, with their tall clustering shafts, pinnacled altars, exquisitely delicate, as though from the hand of the most cunning artificer. Again you stand trembling on the edge of a chasm over 200 feet in depth, and by means of a torch thrown into the abyss reveal fresh wonders to the beholder; there runs a black river, full of eyeless fish. In another part of the Cave is seen what seems to be a colossal theater—tier rises above tier, till they reach the huge overhanging roof. One lonely passage has been explored clear fifty miles in one direction. One river is nearly a mile across, and in some parts the

dripping rock-roof is so low that the passengers in the ferry boat have to bow their heads to pass. In fact, no pen can describe, no pencil portray, the extent, the beauties, the horrors of this dark, mystical subterranean abode—for abode it has been at times. In the part named Audubon's Avenue one sees the shells of several cottages, erected in 1842. It was at that time very generally thought that the equal temperature of the Cave would greatly relieve, if not entirely cure, consumptive patients. The pleasing theory was, however, gainsaid by the result. Many were injured, not benefited by their dwelling in this haunt of Cimmerian blackness.

THE HOT SPRINGS OF ARKANSAS.—The State of Arkansas has a most diversified surface and variety of soil and climate. In the northern section of the State all the productions of the Eastern States are successfully cultivated; apples, for instance, are said to surpass in excellence those grown anywhere else. While in other parts of the State cotton and the products of some tropical countries flourish. Large forests of pine, oak, cherry, and cedar clothe the mountains, and in the lowlands cottonwood grows to a great size. But the most famous natural features of Arkansas are the Springs, situated about 60 miles southwest from Little Rock, and six miles from the Washita River. The Hot Springs Valley is about 700 yards long and 70 yards wide; with a high mountain rising on either side. The springs are 35 in number. These springs range in temperature from that of the coldest well water to 160° Faerenheit. So near are some of these springs of opposite temperature that a person can stand in one place and at the same time dip his hands in fountains of such different degrees that the hand has to be quickly taken from one on account of the heat, from the other on account of the cold. Tens of thousands of invalids have visited these springs in search of health. They have been proved excellent for many complaints, and are reported to be exceedingly efficacious in rheumatic affections, chronic gout, stiff joints, and in diseases produced by injudicious use of mercury. Overlooking Hot Springs Creek is a hilly ridge, 250 feet high, composed of beautiful novaculite of chalcedonis whiteness, of the aged mill-stone grit, differing from the ordinary sand stone by being heated by hot alkaline water. The curative effects of the springs is attributed to the chemical proportions of different articles held in solution and the varied temperatures of the water. There are many wonderful things in the vicinity of the Hot Springs. Near them is an inexhaustible hill of oil-stone, said to be better than any other in the world. This stone is found in many different degrees of fineness. So abundant is magnetic iron in some parts that it seriously interferes with the use of the compass in surveying land. In Pike County there is a mountain of pure alabaster, white as snow. (See page 496).

APPENDIX

TO THE BOOK OF CURIOSITIES:

CONTAINING

CURIOUS EXPERIMENTS,

AND

AMUSING RECREATIONS,

WHICH MAY BE PERFORMED WITH EASE, AND AT A SMALL
EXPENSE.



A Person having an even Number of Counters in one Hand, and an odd Number in the other, to tell in which Hand each of them is.

DESIRE the person to multiply the number in his right hand by three, and the number in his left by two.

Bid him add the two products together, and tell you whether the sum be odd or even.

If it be even, the even number is in the right hand; but if it be odd, the even number is in the left hand.

EXAMPLE I.

No. in right hand.

$$\begin{array}{r} 18 \\ 3 \\ \hline 54 \end{array}$$

No. in left hand.

$$\begin{array}{r} 7 \\ 2 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 54 \\ 14 \\ \hline \end{array}$$

68 sum of the products.

EXAMPLE II.

No in right hand

$$\begin{array}{r} 7 \\ 3 \\ \hline 21 \end{array}$$

No. in left hand.

$$\begin{array}{r} 18 \\ 2 \\ \hline 36 \end{array}$$

$$\begin{array}{r} 36 \\ 21 \\ \hline \end{array}$$

57 sum of the products.

A Person having fixed on a Number in his Mind, to tell him what Number it is.

Bid him quadruple the number thought on, or multiply it by 4; and having done this, desire him to add 6, 8, 10, or any even number you please, to the product; then let him take the half of this sum, and tell you how much it is; from which, if you take away half the number you desired him at first to add to it, there will remain the double of the number thought on.

EXAMPLE.

Suppose the number thought on is	5
The quadruple of it is	20
8 added to the product is	28
And the half of this sum	14
4 taken from this leaves	10.—

Therefore 5 was the number thought on.

Another Method of discovering a Number thought on.

After the person has fixed on a number, bid him double it, and add 4 to that sum; then let him multiply the whole by 5, and to that product add 12; desire him also to multiply this sum by 10, and after having deducted 302 from the product, to tell you the remainder, from which, if you cut off the last two figures, the number that remains will be the one thought on.

EXAMPLE.

Let the number thought on be	7
Then the double of this is	14
And 4 added to it makes	18
This multiplied by 5 is	90
And 12 add d to it is	102
And this multiplied by 10 is	1020
From which deducting	302
There remains	718,—

which, by striking off the last two figures, gives 7,—the number thought on.

To tell the Number a Person has fixed upon, without asking him any Questions.

The person having chosen any number in his mind, from 1 to 15, bid him add one to it, and triple the amount. Then,

If it be an even number, let him take the half of it, and triple that half; but if it be an odd number, he must add 1 to it, and then halve it, and triple that half.

In like manner let him take the half of this number, if it be even, or the half of the next greater, if it be odd; and triple that half.

Again, bid him take the half of this last number, if even, or of the next greater, if odd; and the half of that half in the same way; and by observing at what steps he is obliged to add 1 in the halving, the following table will shew the number thought on:

1—0—0	— 4— 8
2—0—0	— 13— 5
3—0—0	— 3—11
1—2—0	— 2—10
1—3—0	— 8— 0
1—2—3	— 6—14
2—3—0	— 1— 9
0—0—0	—15— 7

Thus, if he be obliged to add 1 only at the first step, or halving, either 4 or 8 was the number thought on; if there were a necessity to add 1 both at the first and second steps, either 2 or 10 was the number thought on, &c.

And which of the two numbers is the true one may always be known from the last step of the operation; for if 1 must be added before the last half can be taken, the number is in the second column, or otherwise in the first, as will appear from the following examples:

Suppose the number chosen to be	9
To which, if we add	1
The sum is	10
Then the triple of that number is	30
1. The half of which is	15
The triple of 15 is	45
2. And the half of that is	23
The triple of 23 is	69
3. The half of that is	35
And the half of that is	18

From which it appears, that it was necessary to add 1 both at the second and third steps, or halvings; and therefore, by the table, the number thought on is either 1 or 9. And as the last number was obliged to be augmented by 1 before the half could be taken, it follows also, by the above rule, that the number must be in the second column; and consequently it is 9.

Again, suppose the number thought on to be	6
To which, if we add	1
The sum is	7
Then the triple of that number is	21
1. The half of which is	11
The triple of 11 is	33
2. And the half of that is	17
The triple of 17 is	51
3. The half of that is	26
And the half of that half is	13

From which it appears, that it was necessary to add 1 at all the steps, or halvings; 1, 2, 3, therefore, by the table, the number thought on is either 6 or 14.

And as the last number required no augmentation before its half could be taken, it follows also, by the above rule, that the number must be in the first column; and consequently it is 6.

A curious Recreation, usually called—The Blind Abbess and her Nuns.

A blind abbess visiting her nuns, who were twenty-four in number, and equally distributed in eight cells, built at the four corners of a square, and in the middle of each side, finds an equal number in every row, containing three cells. At a second visit, she finds the same number of persons in each row as before, though the company was increased by the accession of four men. And coming a third time, she still finds the same number of persons in each row, though the four men were then gone, and had each of them carried away a nun.

Fig. 1.

3	3	3
3		3
3	3	3

Fig. 2.

2	5	2
5		5
2	5	2

Fig. 3.

4	1	4
1		1
4	1	4

Let the nuns be first placed as in fig. 1, three in each cell; then when the four men have got into the cells, there must be a man placed in each corner, and two nuns removed thence to each of the middle cells, as in fig. 2, in which case there will evidently be still nine in each row; and when the four men are gone, with the four nuns with them, each corner cell must contain four nuns, and every other cell one, as in fig. 3; it being evident, that in this case also, there will still be nine in a row, as before.

Any Number being named, to add a Figure to it, which shall make it divisible by 9.

Add the figures together in your mind which compose the number named; and the figure which must be added to this sum, in order to make it divisible by 9, is the one required.

Suppose, for example, the number named was 8654; you find that the sum of its figures is 23; and that 4 being added to this sum will make it 27; which is a number exactly divisible by 9.

You therefore desire the person who named the number 8654, to add 4 to it; and the result, which is 8658, will be divisible by 9, as was required.

This recreation may be diversified, by your specifying, before the sum is named, the particular place where the figure shall be inserted, to make the number divisible by 9; for it is exactly the same thing, whether the figure be put at the end of the number, or between any two of its digits.

A Person having made choice of several Numbers, to tell him what Number will exactly divide the Sum of those which he has chosen.

Provide a small bag, divided into two parts; into one of which put several tickets, numbered 6, 9, 15, 36, 63, 120, 213, 309, or any others you please, that are divisible by 3, and in the other part put as many different tickets marked with the number 3 only.

Draw a handful of tickets from the first part, and, after shewing them to the company, put them into the bag again; and having opened it a second time, desire any one to take out as many tickets as he thinks proper..

When he has done this, open privately the other part of the bag; and tell him to take out of it one ticket only.

You may then pronounce, that this ticket shall contain the number by which the amount of the other numbers is divisible; for, as each of these numbers is some multiple of 3, their sum must evidently be divisible by that number.

This recreation may also be diversified, by marking the tickets in one part of the bag with any numbers which are divisible by 9, and those in the other part of the bag with the number 9 only; the properties of both 9 and 3 being the same; or if the numbers in one part of the bag be divisible by 9, the other part of the bag may contain tickets marked both with 9 and 3, as every number divisible by 9 is also divisible by 3.

To find the Difference between any two Numbers, the greater of which is unknown.

Take as many 9's as there are figures in the less number, and subtract the one from the other.

Let another person add that difference to the larger number; and then, if he take away the first figure of the amount, and add it to the remaining figures, the sum will be the difference of the two numbers, as was required.

Suppose, for example, that Matthew, who is 22 years of

age, tells Henry, who is older, that he can discover the difference of their ages.

He privately deducts 22, his own age, from 99, and the difference, which is 77, he tells Henry to add to his age, and to take away the first figure from the amount.

Then if this figure, so taken away, be added to the remaining ones, the sum will be the difference of their ages; as, for instance:

The difference between Matthew's age and 99, is	77
To which Henry adding his age.....	35
<hr/>	
The sum will be	112
And 1, taken from 112, gives.....	12
Which being increased by	1
<hr/>	
Gives the difference of the two ages	13
And, this added to Matthew's age.....	22
<hr/>	
Gives the age of Henry, which is	35

A Person striking a Figure out of the Sum of two given Numbers, to tell him what that Figure was.

Such numbers must be offered as are divisible by 9; such, for instance, as 36, 63, 81, 117, 126, 162, 207, 216, 252, 261, 306, 315, 360, and 432.

Then let a person choose any two of these numbers, and after adding them together in his mind, strike out any one of the figures he pleases, from the sum.

After he has done this, desire him to tell you the sum of the remaining figures; and that number which you are obliged to add to this amount, in order to make it 9, or 18, is the one he struck out.

For example, suppose he chose the numbers 126 and 252, the sum of which is 378.

Then, if he strike out 7 from this amount, the remaining figures, 3 and 8, will make 11; to which 7 must be added to make 18.

If he strike out the 3, the sum of the remaining figures, 7 and 8, will be 15; to which 3 must be added, to make 18; and so in like manner, for the 8.

By knowing the last Figure of the Product of two Numbers, to tell the other Figures.

If the number 73 be multiplied by each of the numbers in the following arithmetical progression, 3, 6, 9, 12, 15, 18, 21, 24, 27, the products will terminate with the nine digits, in

this order, 9, 8, 7, 6, 5, 4, 3, 2, 1; the numbers themselves being as follows, 219, 438, 657, 876, 1095, 1314, 1533, 1752, and 1971.

Let therefore a little bag be provided, consisting of two partitions, into one of which put several tickets, marked with the number 73; and into the other part, as many tickets numbered 3, 6, 9, 12, 15, 18, 21, 24, and 27,

Then open that part of the bag which contains the number 73, and desire a person to take out one ticket only; after which, dexterously change the opening, and desire another person to take a ticket from the other part.

Let them now multiply their two numbers together, and tell you the last figure of the product, and you will readily determine, from the foregoing series, what the remaining figures must be.

Suppose, for example, the numbers taken out of the bag were 73, and 12; then, as the product of these two numbers, which is 876, has 6 for its last figure, you will readily know that it is the fourth in the series, and that the remaining figures are 87.

A curious Recreation with a Hundred Numbers, usually called the Magical Century.

If the number 11 be multiplied by any one of the nine digits, the two figures of the product will always be alike, as appears from the following example:—

11	11	11	11	11	11	11	11	11
1	2	3	4	5	6	7	8	9
11	22	33	44	55	66	77	88	99

Now, if another person and yourself have fifty counters apiece, and agree never to stake more than ten at a time, you may tell him, that if he will permit you to stake first, you will always undertake to make the even century before him.

In order to this you must first stake one, and remembering the order of the above series, constantly add to what he stakes as many as will make one more than the numbers 11, 22, 33, &c. of which it is composed, till you come to 89; after which, the other party cannot possibly make the even century himself, or prevent you from making it.

If the person who is your opponent have no knowledge of numbers, you may stake any other number first, under 10, provided you afterwards take care to secure one of the last terms, 56, 67, 78, &c.: or you may even let him stake first, provided you take care afterwards to secure one of these numbers.

This recreation may be performed with other numbers; but, in order to succeed, you must divide the number to be attained, by a number which is an unit greater than what you can stake each time; and the remainder will then be the number you first stake. Suppose, for example, the number to be attained is 52, and that you are never to add more than six; then dividing 52 by 7, the remainder, which is 3, will be the number you must stake first; and whatever the other stakes, you must add as much to it as will make it equal to 7, the number by which you divided; and so on.

A Person in Company having privately put a Ring on one of his fingers, to Name the Person, the Hand, the Finger, and even the Joint on which it is placed.

Desire a third person to double the number of the order in which the wearer of the ring stands, and add 5 to that number, then multiply that sum by 5, and to the product add 10. Let him then add 1 to the last number, if the ring be on the right hand, and 2 if on the left, and multiply the whole by 10: to this product he must add the number of the finger, beginning with the thumb, and multiply the whole again by 10. Desire him then to add the number of the joint; and lastly, to increase the whole by 35.

This being done, he is to declare the amount of the whole, from which you are to subtract 3535; and the remainder will consist of four figures, the first of which will give the place in which the person stands, the second the hand, 1 denoting the right, and 2 the left hand, the third number the finger, and the fourth the joint.

EXAMPLE.

Suppose the person stands the second in order, and has put the ring on the second joint of the little finger of the left hand:

Double the order is	4		570
Add	5	Number of finger ..	5
	9		575
Multiply by	5	Multiply by	10
	45		5750
Add	10	Number of joint ..	2
	55		5752
Number for left hand	2	Add	35
	57		5787
Multiply by	10	Subtract	3535
			2252

Hence it will appear that the first 2 denotes the second person in order, the second 2 the left hand, 5 the little finger, and 2 the second joint.

To make a Deaf Man hear the Sound of a Musical Instrument.

It must be a stringed instrument, with a neck of some length, as a lute, a guitar, or the like; and before you begin to play, you must by signs direct the deaf man to take hold with his teeth of the end of the neck of the instrument; for then, if one strikes the strings with the bow one after another, the sound will enter the deaf man's mouth, and be conveyed to the organ of hearing through a hole in the palate, and thus the deaf man will hear with a great deal of pleasure the sound of the instrument, as has been several times experienced; nay, those who are not deaf may make the experiment upon themselves, by stopping their ears so as not to hear the instrument, and then holding the end of the instrument in their teeth, while another touches the strings.

When two Vessels or Chests are like one another, and of equal Weight, being filled with different Metals, to distinguish the one from the other.

This is easily resolved, if we consider that two pieces of different metals, of equal weight in air, do not weigh equally in water, because that of the greatest specific gravity takes up a lesser space in water; it being a certain truth, that any metal weighs less in water than in air; by reason of the water, the room of which it fills; for example, if the water weighs a pound, the metal will weigh in that water a pound less than in the air: this gravitation diminishes more or less, according as the specific gravity of the metal is greater than that of the water.

We will suppose, then, two chests perfectly like one another, of equal weight in the air, one of which is full of gold, and the other of silver; we weigh them in water, and that which then weighs down the other must needs be the gold chest, the specific gravity of gold being greater than that of silver, which makes the gold lose less of its gravitation in water than silver. We know by experience, that gold loses in water about an eighteenth part only, whereas silver loses near a tenth part; so that if each of the two chests weighs in the air, for example, 180 pounds, the chest that is full of gold will lose in the water ten pounds of its weight; and the chest that is full of silver will lose eighteen: that is, the chest full of gold will weigh 170 pounds, and that of silver only 162.

Or, if you will, considering that gold is of a greater specific gravity than silver, the chest full of gold, though similar and

of equal weight with the other, must needs contain a less bulk, and consequently it contains the gold.

To find the Burden of a Ship at Sea, or in a River.

It is a certain truth, that a ship will carry a weight equal to that of a quantity of water of the same bulk with itself; subtracting from it the weight of the iron about the ship, for the wood is of much the same weight with water; and so, if it were not for the iron, a ship might sail full of water.

The consequence of this is, that, however a ship be loaded, it will not totally sink, as long as the weight of its cargo is less than that of an equal bulk of water: now, to know this bulk or extent, you must measure the capacity or solidity of the ship, which we here suppose to be 1000 cubical feet, and multiply that by 73 pounds, the weight of a cubical foot of sea-water; then you have in the product 73,000 pounds for the weight of a bulk of water equal to that of the ship; so that in this example, we may call the burden of the ship 73,000 pounds, or $36\frac{1}{2}$ tons, reckoning a ton 2,000 pounds, that being the weight of a ton of sea-water; if the cargo of this ship exceeds $36\frac{1}{2}$ tons, she will sink; and if her loading is just 73,000 pounds, she will swim very deep in the water upon the very point of sinking; so that she cannot sail safe and easy, unless her loading be considerably short of 73,000 pounds weight; if the loading come near to 73,000 pounds, as being, for example, just 36 tons, she will swim at sea, but will sink when she comes into the mouth of a fresh water river; for this water being lighter than sea-water will be surmounted by the weight of the vessel, especially if that weight is greater than the weight of an equal bulk of the same water.

To Measure the Depth of the Sea.

Tie a great weight to a very long cord, or rope, and let it fall into the sea till you find it can descend no further, which will happen when the weight touches the bottom of the sea: if the quantity or bulk of water, the room of which is taken up by the weight, and the rope, weighs less than the weight and rope themselves; for if they weigh more, the weight would cease to descend, though it did not touch the bottom of the sea.

Thus one may be deceived in measuring the length of a rope let down into the water, in order to determine the depth or the sea; and therefore, to prevent mistakes, you had best tie to the end of the same rope another weight heavier than the former, and if this weight does not sink the rope deeper than

the other did, you may rest assured that the length of the rope is the true depth of the sea; if it does sink the rope deeper, you must tie a third weight, yet heavier, and so on, till you find two weights of unequal gravitation, that run just the same length of the rope, upon which you may conclude, that the length of the wet rope is certainly the same with the depth of the sea.

Method of Melting Steel, and causing it to Liquefy.

Heat a piece of steel in the fire, almost to a state of fusion, then holding it with a pair of pincers or tongs, take in the other hand a stick of brimstone, and touch the piece of steel with it: immediately after the contact, you will see the steel melt and drop like a liquid.

How to dispose two little Figures, so that one shall light a Candle, and the other put it out.

Take two little figures of wood or clay, or any other materials you please, only taking care that there is a little hole at the mouth of each: put in the mouth of one a few grains of bruised gunpowder, and a little bit of phosphorus in the mouth of the other, taking care that these preparations are made beforehand.

Then take a lighted wax candle, and present it to the mouth of the figure with the gunpowder, which, taking fire, will put the candle out; then present your candle, having the snuff still hot, to the other figure; it will immediately light again by means of the phosphorus.

You may propose the same effects to be produced by two figures drawn on a wall with a pencil or coal, by applying with a little starch, or water, a few grains of bruised gunpowder to the mouth of one, and a bit of phosphorus to the mouth of the other.

The Camera Obscura, or Dark Chamber.

We shall here give a short description of this optical invention; for though it is very common, it is also very pleasing: but every one knows not how to construct it.

Make a circular hole in the shutter of a window, from whence there is a prospect of the fields, or any other object not too near: and in this hole place a convex glass, either double or single, whose focus is at the distance of five or six feet: the distance should not be less than three feet; if it be, the images will be too small, and there will not be sufficient room for the spectators to stand conveniently; on the other hand,

the focus should never be more than fifteen or twenty feet, for then the images would be obscure, and the colouring faint; the best distance is from six to twelve feet:—take care that no light enters the room but by this glass: at a distance from it, equal to that of its focus, place a pasteboard, covered with the whitest paper; this paper should have a black border, to prevent any of the side rays from disturbing the picture, let it be two feet and a half long, and eighteen or twenty inches high; bend the length of it inwards to the form of part of a circle, whose diameter is equal to double the focal distance of the glass: then fix it on a frame of the same figure, and put it on a moveable foot, that it may be easily fixed at that exact distance from the glass where the objects paint themselves to the greatest perfection: when it is thus placed, all the objects that are in the front of the window will be painted on the paper in an inverted position; this inverted position of the images may be deemed an imperfection, but it is easily remedied; for if you stand above the board on which they are received, and look down on it, they will appear in their natural position; or if you stand before it, and, placing a common mirror against your breast in an oblique direction, look down in it, you will there see the images erect, and they will receive an additional lustre from the reflection of the glass: or place two lenses in a tube that draws out: or, lastly, if you place a large concave mirror at a proper distance before the picture, it will appear before the mirror in the air, and in an erect position, with the greatest regularity, and in the most natural colours.

If you place a moveable mirror without the window, by turning it more or less, you will have on the paper all the objects that are on each side of the window.

There is another method of making the dark chamber, which is by a scioptric ball, that is, a ball of wood, through which a hole is made, in which hole a lens is fixed; this ball is placed in a wooden frame, in which it turns freely round: the frame is fixed to the hole in the shutter, and the ball by turning about answers, in great part, the use of the mirror on the outside of the window: if the hole in the window be no bigger than a pea, the objects will be represented without any lens.

If instead of placing the mirror without the window, you place it in the room, and above the hole, (which must then be made near the top of the shutter,) you may receive the representation on a paper placed horizontally on a table; and draw at your leisure all the objects that are there painted.

Nothing can be more pleasing than this recreation, especially when the objects are strongly enlightened by the sun; and not only land prospects, but a sea-port, when the water

is somewhat agitated, or at the setting of the sun, presents a very delightful appearance.

This representation affords the most perfect model for painters, as well for the tone of colours, as that gradation of shades occasioned by the interposition of the air, which has been so justly expressed by some modern painters.

It is necessary that the paper have a circular form, for otherwise, when the centre of it was in the focus of the glass, the two sides would be beyond it, and consequently the images would be confused: if the frame were contrived of a spherical figure, and the glass were in its centre, the representation would be still more accurate. If the object without be at the distance of twice the focal length of the glass, the image in the room will be of the same magnitude with the object.

The lights, shades, and colours in the camera obscura, appear not only just, but, by the images being reduced to a smaller compass, much stronger than in nature; add to this, that these pictures exceed all others, by representing the motion of the several objects: thus we see the animals walk, run, or fly, the clouds float in the air, the leaves quiver, the waves roll, &c. and all in strict conformity to the laws of nature. The best situation for a dark chamber is directly north, and the best time of the day is noon.

To shew the Spots in the Sun's Disk, by its image in the Camera Obscura.

Put the object-glass of a ten or twelve feet telescope into the scioptric ball, and turn it about till it be directly opposite the sun: when the sun is directly opposite the hole, the lens will itself be sufficient; or by means of the mirror on the outside of the window, as in the last recreation, in the focus of the lens, and you will see a clear bright image of the sun, of about an inch diameter, in which the spots on the sun's surface will be exactly described.

As this image is too bright to be seen with pleasure by the naked eye, you may view it through a lens, whose focus is six or eight inches diameter, which, at the same time that it prevents the light from being offensive, will, by magnifying both the image and the spots, make them appear to greater advantage.

To magnify small Objects by means of the Sun's Rays let into a dark Chamber.

Let the rays of light that pass through the lens in the shutter be thrown on a large concave mirror properly fixed

in a frame; then take a slip, or thin plate, of glass, and sticking any small object on it, hold it in the incident rays, at a little more than the focal distance from the mirror, and you will see, on the opposite wall, amidst the reflected rays, the image of that object, very large, and extremely clear and bright. This experiment never fails to give the spectator the highest satisfaction.

To cut a Looking-glass, or piece of Crystal, let it be ever so thick, without the help of a Diamond, in the same shape as the Mark of the Drawing made on it with Ink.

This remarkable operation unites utility with amusement; for being in the country, or in a place where there is no glazier to be had, the following means will answer the purpose without their help.

Take a bit of walnut-tree, about the thickness of a candle; and cut one of its ends to a point; put that end in the fire, and let it burn till it is quite red: while the stick is burning, draw on the glass or crystal, with ink, the design or outline of the form in which you mean to cut it out: then take a file, or bit of glass, and scratch a little the place where you mean to begin your section; then take the wood red-hot from the fire, and lay the point of it about the twentieth part of an inch, or thickness of a guinea, from the marked place, taking care to blow always on that point, in order to keep it red; following the drawing traced on the glass, leaving, as before, about the twentieth part of an inch interval every time that you present your piece of wood, which you must take care to blow often.

After having followed exactly the outlines of your drawing, to separate the two pieces thus cut, you need only pull them up and down, and they will divide.

By the means of two plain Looking-glasses, to make a Face appear under different forms.

Having placed one of the two glasses horizontally, raise the other to about right angles over the first; and while the two glasses continue in this posture, if you come up to the perpendicular glass, you will set your face quite deformed and imperfect; for it will appear without forehead, eyes, nose, or ears, and nothing will be seen but a mouth and a chin boldly raised: do but incline the glass ever so little from the perpendicular, and your face will appear with all its parts, excepting the eyes and the forehead; stoop a little more, and you will see two noses and four eyes; and then a little further, and you will see three noses and six eyes;—continue to incline

it still a little more, and you will see nothing but two noses, two mouths, and two chins; and then a little further again, and you will see one nose and one mouth; at last incline a little further, that is, till the angle of inclination comes to be 44 degrees, and your face will quite disappear.

If you incline the two glasses, the one towards the other, you will see your face perfect and entire; and by the different inclinations, you will see the representation of your face, upright and inverted, alternately.

To know which of two different Waters is the lightest, without any Scales.

Take a solid body, the specific gravity of which is less than that of water, deal, or fir-wood, for instance, and put it into each of the two waters, and rest assured that it will sink deeper in the lighter than in the heavier water; and so, by observing the difference of the sinking, you will know which is the lightest water, and consequently the wholesomest for drinking.

To know if a suspicious Piece of Money is good or bad.

If it be a piece of silver that is not very thick, as a crown, or half a crown, the goodness of which you want to try; take another piece of good silver, of equal balance with it, and tie both pieces with thread or horse hair to the scales of an exact balance, (to avoid the wetting of the scales themselves,) and dip the two pieces thus tied, in water; for then, if they are of equal goodness, that is, of equal purity, they will hang in equilibrio in the water as well as in the air: but if the piece in question is lighter in the water than the other, it is certainly false, that is, there is some other metal mixed with it, that has less specific gravity than silver, such as copper; if it is heavier than the other, it is likewise bad, as being mixed with a metal of greater specific gravity than silver, such as lead.

If the piece proposed is very thick, such as that crown of gold which Hiero, king of Syracuse, sent to Archimedes, to know if the goldsmith had put into it all the eighteen pounds of gold that he had given him for that end; take a piece of pure gold of equal weight with the crown proposed, viz. eighteen pounds; and without taking the trouble of weighing them in water, put them into a vessel full of water, one after another, and that which drives out most water, must necessarily be mixed with another metal of less specific gravity than gold, as taking up more space, though of equal weight.

To hold a Glass full of Water with the Mouth downwards, so that the Water shall not run out.

Take a glass full of water, cover it with a cup that is a little hollow, inverting the cup upon the glass; hold the cup firm in this position with one hand, and the glass with the other; then with a jerk turn the glass and the cup upside down, and so the cup will stand upright, and the glass will be inverted, resting its mouth upon the interior bottom of the cup: this done, you will find that part of the water contained in the glass will run out by the void space between the bottom of the cup, and the brim of the glass; and when that space is filled, so that the water in it reaches the brim of the glass, all passage being then denied to the air, so that it cannot enter the glass, nor succeed in the room of the water, the water remaining in the glass will not fall lower, but continue suspended in the glass.

If you would have a little more water descend into the cup, you must, with a pipe or otherwise, draw the water out of the cup, to give passage to the air in the glass; upon which, part of the water will fall into the glass till it has stopped up the passage of the air afresh, in which case no more will come down; or, without sucking out the water in the cup, you may incline the cup and glass so that the water in the cup shall quit one side of the brim of the glass, and so give passage to the air, which will then suffer the water in the glass to descend till the passage is stopped again.

This may likewise be resolved by covering the brim of the glass that is full of water, with a leaf of strong paper, and then turn the glass as above; and without holding your hand any longer upon the paper, you will find it as it were glued for some time to the brim of the glass, and during that time the water will be kept in the glass.

The Mysterious Watch.

Desire any person to lend you his watch, and ask if he thinks it will or will not go when it is laid on the table: if he says it will, place it over the end of a magnet, and it will presently stop; then mark with chalk, or a pencil, the precise point where you placed the watch, and, moving the position the magnet, give the watch to another person, and desire him to make the experiment; in which he not succeeding, give it to a third person, at the same time replacing the magnet, and he will immediately perform the experiment.

To make a Glass of Water appear to boil and sparkle.

Take a glass nearly full of water, or other liquor, and setting one hand upon the foot of it to hold it fast, turn

slightly one of the fingers of your other hand upon the brim or edge of the glass, (having before privately wet your finger,) and so passing softly on, with your finger pressing a little, then the glass will begin to make a noise, the parts of the glass will sensibly appear to tremble with notable rarefaction and condensation, the water will shake, seem to boil, cast itself out of the glass, and leap out by small drops, to the great astonishment of the observers, if they are ignorant of the cause, which is only the rarefaction of the parts of the glass, occasioned by the motion and pressure of the finger.

How to make a Cork fly out of a Bottle.

Put a little chalk or pounded marble into a phial, and pour on some water, with about a third part of sulphuric acid, and put in a cork: in a few seconds, the cork will be sent off with great violence.

To produce Gas Light, on a small Scale.

Take an ordinary tobacco pipe, and nearly fill the bowl with small coals, and stop the mouth of the bowl with any suitable luting, as pipe-clay, or the mixture of sand and common clay, or, as clay is apt to shrink, of sand and beer, and place the bowl in a fire between the bars of a grate, so that the pipe may stand nearly perpendicular. In a few minutes, if the luting be good, the gas will begin to escape from the stem of the pipe, when, if a piece of lighted paper or candle be applied, it will take fire and burn for several minutes with an intense light. When the light goes out, a residuum of useful products will be found in the bowl.

Thunder Powder.

Take separately, three parts of good dry saltpetre, two parts of dry salt of tartar, and pound them well together in a mortar; then add thereto one part, or rather more, of flour of brimstone, and take care to pound and mix the whole perfectly together: put this composition into a bottle with a glass stopper, for use.

Put about two drams of this mixture in an iron spoon, over a moderate fire, but not in the flame; in a short time it will melt, and go off with an explosion like thunder or a loaded cannon.

To tell, by the Dial of a Watch, at what hour any Person intends to rise.

Let the person set the hand of the dial to any hour he pleases, and tell you what hour that is, and to the number of

that hour you add, in your mind, 12. After this, tell him to call the hour the index stands at that which he has fixed upon; and by reckoning backwards from this number to the former, it will bring him to the hour required.

EXAMPLE.

Suppose the hour at which he intends to rise be 3, and that he has placed the hand at 5.

Then, adding 12 to 5, you bid him call the hour at which the index stands, the number on which he thought; and by reckoning back from this number to 17, it will bring him to 8, the hour required.

The following Experiment shews the Power of Attraction.

If we take two pieces of lead, as two musket or pistol balls, and with a knife smooth two plane surfaces, and press them together, they will firmly adhere.

Two plates of metal made very smooth, when rubbed with oil and put together, will so firmly adhere, that it will require a great force to separate them.

If two pieces of wood, or of glass, be wetted with water, and placed together, the one may be lifted up by means of the other. Boys often have a piece of leather on the end of a string, which they wet and put on a stone, and thereby lift it up.

If we take a small tube of glass with a narrow bore, and put it in water, the fluid will rise higher within the tube than in the vessel. The narrower the tube is, the higher the water rises. This is called Capillary Attraction. If we put two pieces of glass together, and place the lower edge in water, it will rise between them, as it does in the capillary tubes. This experiment may be made more pleasing, by putting a shilling or a piece of paper between the two pieces of glass at one end. The water will then rise in a curve line, called an hyperbola, higher and higher as it recedes from the shilling or piece of paper, and the pieces of glass get nearer to each other.

Place a balance equally poised, so that one scale may be made to touch water in a vessel; considerable weight must be put in the other scale, to make it rise up. Put three or four bits of cork to float in a basin of water; they will gradually draw nearer to each other, and the more rapidly as the distance diminishes.

Experiments to shew the Power of Repulsion.

Dip a ball in oil and put it in water; a ditch will be formed all round it. Pour water on oiled paper, and it will run off.

Sprinkle water on a dusty floor, it rolls over it in globules; Sprinkle it upon a floor that has been swept, and this will not be the case, as it then comes in contact with the wood, and is diffused over it.

We may observe that rain water stands in globules on the leaves of cabbages. If we blow up soap-bubbles, and let them fall on the carpet, they will not for some time burst. Let them fall on the table, or any smooth surface, and they will burst instantly.

If we pour as much water into a cup as it will possibly hold, we shall see the water above the level of the sides, if the edge be dry, but otherwise we shall not.

Lay a very fine needle, or a piece of tinfoil, on the surface of water, and it will float, until it become wet, when it sinks.

Lay a piece of gold on mercury, and it will float on the surface; but if depressed below the surface, it will sink to the bottom, like the needle on water.

Experiments respecting the Centre of Gravity.

The centre of gravity is that part of a body, round which all its parts are so equally balanced, that, if it be supported, the whole body will be so too.

Take a book, and find, by trial, under what part the finger must be placed to keep the book from falling; that point is the centre of gravity.

Take a rod, or stick, and find that place about the middle of it, under which the finger being placed, it will be balanced; that is the centre of gravity. The moment the centre of gravity ceases to be supported, the whole body falls.

Move a piece of board to the edge of a table, and gradually farther and farther off it; the instant the centre of gravity gets beyond the edge of the table, the board falls.

Run the point of a knife much slanting into the same board, it may then be brought much farther over the edge of the table than it could before, as the knife, leaning the way of the table, brings the centre of gravity that way.

Take a bottle, with a cork in it; stick in the middle of the cork a needle, with the point upwards; then take another cork, and with a knife make a slit in one of its ends, in which place a shilling so far as to make it fast; then take two forks, or penknives, and stick one on each side the cork, slanting a little downwards; then place the edge of the shilling on the point of the needle, and it will rest secure. It may be made to revolve, with great rapidity, on the point of the needle, without falling off.

The following Experiment shews the Power of Steam.

Put a little water in a bottle, and cork it securely, covering it with sealing wax; then put the bottle into a kettle of water, and let it boil a short time, and the steam will force out the cork.

Diminution of Heat by Evaporation.

Pour water on a piece of writing-paper, and hold it over a candle; it will boil without burning the paper.

Water may be boiled in an egg-shell on the fire.

Experiment to ascertain the Strength of Spirits of Wine.

It is a common practice for apothecaries, in order to ascertain if spirit of wine be sufficiently strong, to pour some into a cup upon some gunpowder, and then to set fire to it. If the spirit be sufficiently strong, after burning down to the gunpowder, it will make it go off; but if too much water has been poured in, that will not take place, as, after the spirit is consumed, there will still be water enough to keep the powder wet.

To ascertain the Strength of Brine.

To ascertain the strength of brine for salting meat, it is usual to put an egg in the boiling water, and gradually put in salt until the egg be made to swim.

The following Experiments shew the Pressure and Elasticity of Air.

Put an empty bottle with a cork in it near the fire; the cork will be driven out.

Get a vessel of hot water, and put a phial into it, with the mouth downwards; the expanded air will bubble out. Let the water cool, or pour cold water on the phial, of which the mouth has not been drawn above the surface of the water, and as the air is now cooled, and occupies less space, a considerable part of the bottle will be filled with water.

Boil a little water in a glass phial over a candle for a few minutes; then invert the mouth of the phial in water, and, as it cools, the air will contract, and water will be forced up the bottle, by the external air, to occupy the vacant space.

Lay a weighty book on a bladder, and blow into it with a pipe, and the book will be raised. Increase the weight on the bladder very much indeed, and you may still raise it as before.

A bladder filled with air may be compressed, and the moment the force is removed, it will recover its size. If thrown on the ground it will rise like a ball.

Take a cup, and burn a few pieces of paper in it, the heat will expand the air in it. Invert the cup now in a saucer of water, and, as the enclosed air cools, it will return to its former density, and leave a vacuum, and the pressure of the external air will force a great deal of water up into the cup. If this experiment be performed with a large drinking-glass, the water may be seen to rise in the glass.

The pressure of the air may be very sensibly felt, by putting the hole of a common bellows over the knee, and then attempting to raise the upper part of it.

Boil water in a glass phial over a candle for a few minutes, then suddenly removing it, tie a piece of wetted bladder over the mouth, making it fast with a string; the pressure of the air will stretch the bladder, if it do not burst it.

Get a glass vessel, as a common tumbler, if no better be at hand, and put a piece of wetted bladder over the mouth, pressing it down in the middle, and then tie it firm with a string; then lay hold of the bladder in the middle, and try to pull it straight, or level with the rest, and the pressure of the external air will not permit it.

Do exactly the same as before, except that the vessel must be nearly full of water. Turn the vessel upside-down, and the bladder will still continue as it was placed, the pressure of the air overcoming the weight of the water.

Though air be capable of compression, it makes a resistance, and that very considerable. The ball of an air-gun has been burst asunder by overcharging it. If bottles are filled too much, they may be burst in attempting to cork them, from the air between the cork and the liquor being too much condensed.

Put a common wine-glass, with the mouth downwards, into water; and to whatever depth it may be plunged, the air will not allow much water to rise into it, as may be seen by the inside of the glass not being wet. If a bit of cork float inside of the glass, it will point out to the eye still more clearly how high the water rises. This experiment, though so very simple, will illustrate the nature of the diving-bell.

Experiments respecting Sound.

Hold a tumbler sideways, and sprinkle a little dust, or powder of any sort, on it; then strike the glass, and make it sound:—the dust keeps dancing about whilst the sound continues; stop the sound, and the dust is at rest.

The sound of a watch laid upon a long table, or upon a

plank of wood, will be heard much farther than it otherwise would.

When a vessel on the fire begins to boil, let a communication be made between it and the ear, by means of the poker, and the sound is more distinctly heard.

Tie a string round the end of a poker, and then, winding one end of the string round the fore-finger of the one hand, and the other end of the string round the fore-finger of the other; put the fingers into the ears, and make the poker strike against a table, or any other object, and it will sound like the bell of a church.

Tie a string round the end of a poker, as before, and hold the string with your teeth; when the poker is made to strike against any object, as in the last experiment, the same kind of sound will be transmitted through the teeth.

Make a watch touch your teeth, and you will hear its beating more distinctly.

When a pitchfork is struck, in order to pitch a tune, its end is put on the table, and a greater sound is produced. If the pitchfork, after being struck, be held to the teeth, its sound is still more distinct.

Having shut up both ears with cotton very closely, put your fingers on the teeth of a person who speaks to you, and you will hear his voice.

Electrical Experiments.

If a piece of sealing-wax be rubbed briskly against the sleeve of your coat, or any other woollen substance, for some time, and then held within an inch or less of hair, feathers, bits of paper, or other light bodies; they will be attracted, that is, they will jump up, and adhere to the wax. If a tube of glass, or small phial, be rubbed in a similar manner, it will answer much better. The bottle thus rubbed becomes electric; and when the operation is performed in a dark room, small flashes of divergent flame, ramified somewhat like trees bare of leaves, will dart into the air, from many parts of the surface of the tube, to the distance of six or eight inches, attended with a crackling noise; and sometimes sparks will fly along the tube to the rubber at more than a foot distant.

Cut two bits of cork into the shape and size of a common pea. With a needle, draw a thread through each of the corks, so that they may be made to hang at the ends of the threads with a knot below them. Let the other ends of the threads be inserted in the notch of a small piece of wood, about a foot long, and an inch broad, and the thickness of a common match. Lay the piece of wood over two wine-glasses, a few inches asunder so that the end of it, in which the threads

are, may project over the edge of the glass nearest it, and the corks may be in contact one with another. Take another wine-glass, and, having rubbed it briskly with a piece of flannel, or upon the skirt or sleeve of a woollen coat, hold its mouth to within about an inch of the corks, and they will suddenly start asunder, and continue so for some time.

Lay a pocket-watch upon a table, and take a common tobacco-pipe, and place it on the face of the watch so that it may balance thereon; then, after rubbing a wine-glass, as described in the former experiment, bring it to within an inch of the smaller end of the tobacco-pipe, and by moving the glass gently round in an horizontal circular track, you will cause the pipe to turn round on the watch-glass, as the needle turns on its centre in a mariner's compass.

A curious Experiment made by Mr. Symmer, on the Electricity of Silk Stockings.

This gentleman having frequently observed, that on putting off his stockings in the evening, they made a crackling or snapping noise, and that in the dark they emitted sparks of fire, was induced to examine on what circumstances these electrical appearances depended. After a considerable number of observations, directed to this point, he found that it was the combination of white and black which produced the electricity, and that the appearances were the strongest when he wore a white and a black stocking upon the same leg. These, however, discovered no signs of electricity while they were upon the leg, though they were drawn backwards and forwards upon it several times; but the moment they were separated, they were both of them found to be highly electrified, the white positively, and the black negatively; and when they were held at a distance from each other, they appeared inflated to such a degree, that they exhibited the entire shape of the leg.

When two black or two white stockings were held together, they would repel one another to a considerable distance; and when a white and black stocking were presented to each other, they would be mutually attracted, and rush together with great violence, joining as close as if they had been so many folds of silk; and in this case their electricity did not seem to have been in the least impaired by the shock of meeting, for they would be again inflated, attract, repel, and rush together, as before.

When this experiment was performed with two black stockings in one hand, and two white ones in the other, it exhibited a still more curious spectacle. The repulsion of those of the same colour, and the attraction of those of different colours,

threw them into an agitation, and made each of them catch at the opposite colour in a way that was very amusing.

What was also very remarkable in these experiments with a white and black stocking, was, the power of electrical cohesion which they exhibited; Mr. Symmer having found, that when they were electrified, and allowed to come together, they frequently stuck so close to each other, that it required a weight of sixteen or seventeen ounces to separate them, and this in a direction parallel to their surfaces.

When one of the stockings was turned inside-out, it required twenty ounces to separate them; and by having the black stockings new dyed, and the white ones washed, and whitened in the fumes of sulphur, and then putting them one within the other, it required three pounds three ounces to separate them.

Trying this experiment with stockings of a more substantial make, he found that, when the white stocking was put within the black one, so that its outside was contiguous to the inside of the other, they raised near nine pounds; and when the white stocking was turned inside-out, and put within the black one, so that their rough surfaces were contiguous, they raised fifteen pounds, which was ninety-two times the weight of the stockings. And, in all these cases, he found that pressing them together with his hands contributed much to strengthen the cohesion.

When the white and black stockings were in cohesion, and another pair, more highly electrified, were separated from each other, and presented to the former, their cohesion would be dissolved, and each stocking of the second pair would catch hold of, and carry away with it, that of its opposite colour; but if the degree of electricity of both pairs were equal, the cohesion of the former would be weakened, but not dissolved, and all the four would cohere together in one mass.

Mr. Symmer also observed, that white and black silk, when electrified, not only cohered with each other, but they would also adhere to bodies with broad, and even polished, surfaces, though those bodies were not electrified. This he discovered, by throwing accidentally a stocking out of his hand, which stuck to the paper-hangings of the room, and which, in another experiment of this kind, continued hanging there nearly an hour.

Having stuck up the black and white stockings in this manner, he came with another pair of stockings, highly electrified, and applying the white to the black, and the black to the white, he carried them off from the wall, each of them hanging to that which had been brought to it. The same experiment also held with the painted boards of the room, and likewise with the looking-glass, to the smooth surface of

which, the white and black stockings appeared to adhere more tenaciously than to either of the former.

To suspend a Ring by a Thread that has been burnt.

The thread having been previously soaked in chamber lye, or common salt and water, tie it to a ring, not larger than a wedding-ring. When you apply the flame of a candle to it, though the thread burn to ashes, it will yet sustain the ring.

Chemical Illuminations.

Put into a middling-sized bottle, with a short wide neck, three ounces of oil or spirit of vitriol, with twelve ounces of common water, and throw into it, at different times, an ounce or two of iron filings. A violent commotion will then take place, and white vapours will arise from the mixture. If a taper be held to the mouth of the bottle, these vapours will inflame, and produce a violent explosion; which may be repeated as long as the vapours continue.

To make the Appearance of a Flash of Lightning when any one enters a Room with a lighted Candle.

Dissolve camphor in spirit of wine, and deposit the vessel containing the solution in a very close room, where the spirit of wine must be made to evaporate by strong and speedy boiling. If any one then enters the room with a lighted candle, the air will inflame; but the combustion will be so sudden, and of so short duration, as to occasion no danger.

The Fiery Fountain.

If twenty grains of phosphorus, cut very small, and mixed with forty grains of powdered zinc, be put into four drachms of water, and two drachms of concentrated sulphuric acid be added thereto, bubbles of inflamed phosphuretted hydrogen gas will quickly cover the whole surface of the fluid in succession, forming a real fountain of fire.

A Lamp that will burn Twelve Months without replenishing

Take a stick of phosphorus, and put it into a large dry phial, not corked, and it will afford a light sufficient to discern any object in a room, when held near it. The phial should be kept in a cool place, where there is no great current of air, and it will continue its luminous appearance for more than twelve months.

The Magic Oracle.

Get six blank cards, and write on them figures, or numbers, exactly according to the following patterns

No. I.

				17					
			19		3				
			13		1	27			
		21		5		29	47		
	23		7		31		45	59	
15		11		33		43		0	57
	9		35		41		55		0
		25		39		53		0	
			37		0		0		
				49		0			
					51				

No. II.

				14					
			18		3				
			15		2	35			
		22		6		34	47		
	19		10		31		46	59	
23		11		30		43		0	58
	7		27		42		55		0
		26		39		54		0	
			38		0		0		
				50		0			
					51				

No. III.

				14					
			13		7				
		21		4		37			
			5		36		47		
	23				31		46	60	
	20		6						
32		12		30		45		0	55
	15		29		44		0		0
		28		39		54		0	
			38		0		0		
				52		0			
					53				

No. IV.

			15	10			
		12	9	8	41		
	26	11	31	40	47		
25	27	13	30	45	46	60	59
	12	29	44	0	0	0	
	28	43	57	0	0		
	42	0	24	0			
	0	56	0	0			
	0	58	0	0			

No. V.

			22	17			
		26	16	49			
	23	18	48	55			
25	20	31	54	60			
27	21	30	53	0	59		
19	29	52	58	0			
	28	51	57	0			
	50	0	0	0			
	0	56	0	0			
	0	58	0	0			

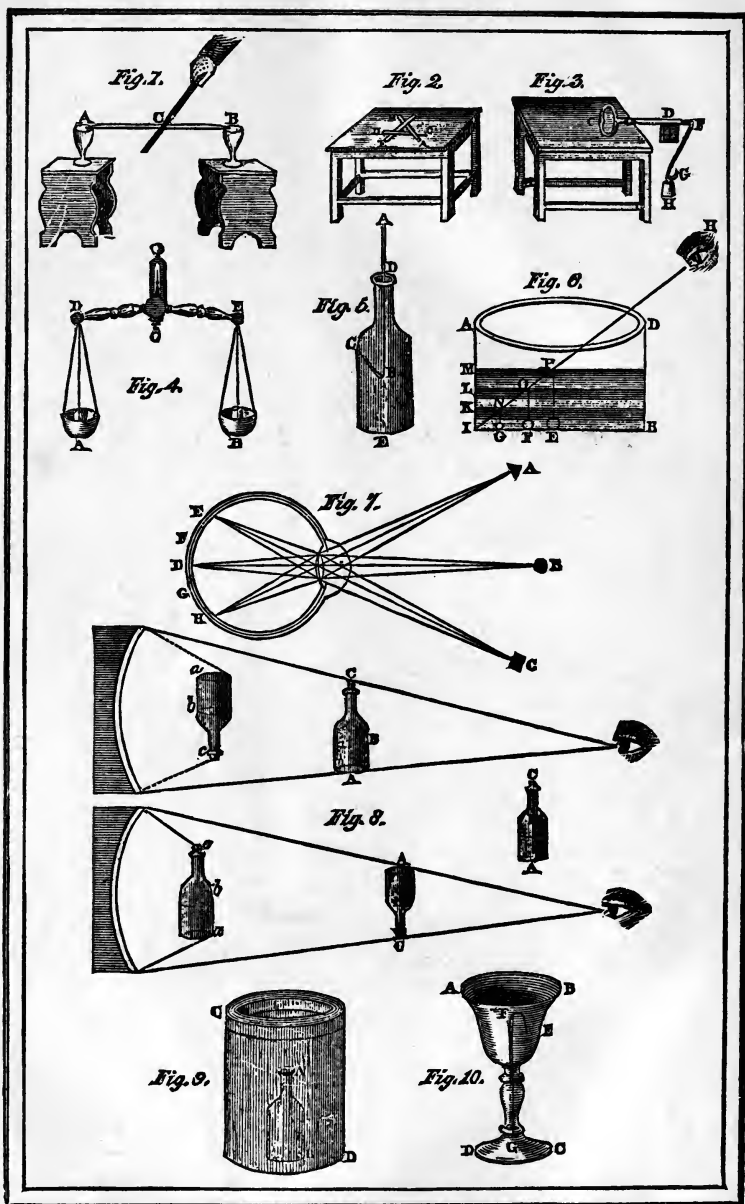
No. VI.

			38	34			
		39	32	49			
	41	35	48	55			
42	43	37	47	54	60	59	
	33	46	53	0	0		
	36	45	52	0	0		
	44	51	57	0			
	50	0	0	0			
	0	56	0	0			
	0	58	0	0			

You deliver the cards to a person, and desire him to think of any number from one to sixty; he is then to look at the cards, and say in which cards the number he thought of is to be found; and you immediately tell him the number thought of.



EGYPTIAN OBELISK, IN CENTRAL PARK, NEW YORK.



DIAGRAMS OF EXPERIMENTS.

EXPLANATION.

This surprising and ingenious recreation is done by means of a key number. There is a key number in every card viz the last but one in the second row from the top. From this explanation the reader will perceive that the key numbers are 1, 2, 4, 8, 16, 32. Now whatever number is fixed on, from 1 to 60, will be readily found by privately adding together the key numbers of the cards that contain the number thought on. For instance, suppose a person thinks of number 43; he looks at the cards, and gives you No. 1, 2, 4, 5, 6, as cards which contain the number thought on: you expertly perceive that the key numbers are 1, 2, 8, 32; which numbers added together make 43, the number thought on. Suppose he thinks of No. 15, he gives you No. 1, 2, 3, 4: the key numbers are 1, 2, 4, 8; which added, make just 15; and so of all numbers from 1 to 60.

This recreation may be varied many ways; as, telling the age of a person, &c.; but this is left to the ingenious reader's taste and application.

Cheap and Easy Method of constructing a Voltaic Pile.

Mr. Mitchell, in his useful little work on natural philosophy, proposes the following cheap and easy method of constructing a Voltaic Pile. Zinc is one of the cheapest of metals, and may be easily melted, like lead. Let the student cast twenty or thirty pieces, of the size of a penny-piece, which may easily be done in moulds made in clay. Let him then get as many penny-pieces, and as many pieces of paper, or cloth cut in the same shape, and these he must dip in a solution of salt and water. In building the pile, let him place a piece of zinc, wet paper, (the superabundant water being squeezed out,) after which the copper; then zinc, paper, copper, &c. until the whole be finished. The sides of the pile may be supported with rods of glass, or varnished wood, fixed in the board on which it is built. The following experiment may then be performed:—

Having wetted both hands, touch the lower part of the pile with one hand, and the upper part with the other, constant little shocks of electricity will be felt until one hand be removed. If the hand be brought back, a similar repetition of shocks will be felt. Put a basin of water near the pile, and put the left hand into it, holding a wire, one end of which touches the top of the battery or pile; then put the end of a silver spoon between the lip and the gum, and with the other end of the spoon touch the lower part of the pile; a strong shock is felt in the gum and in the hand. Take the left hand from the water, but still keep hold of the wire, and then

perform the last experiment in the same manner, and a shock will be felt in the gum only. Hold a silver spoon in one hand, and touch with it the battery at the lower part, then touch the upper part with the tongue; the bitter taste will be extreme.

In performing the above experiments, if, instead of the two ends of the pile, the one end and the middle of it be touched, the sensations will not be nearly so strong. If the student be desirous of having still more sensible proofs of the effect of galvanism, let him hold a wire to the top of the battery, and let him place one end of a silver spoon to the lower part, and the other end within his mouth, so as to touch the gums; a severe set of shocks will be felt. In performing this experiment, move the spoon to the roof of the mouth, and a strong sensation will be felt. Let the end of the spoon be run up the nose so as to touch the cartilaginous bone; shocks like the stabs of a needle will be felt. Let the end of the spoon be put under the eye-brow, close to the ball of the eye; a sensation will be felt like the burning of red-hot iron, but which ceases the instant the spoon is removed.

Magnetical Experiments.

The magnetic attraction will not be destroyed by interposing obstacles between the magnet and the iron.

Lay a small needle on a piece of paper, and put a magnet under the paper; the needle may be moved backwards and forwards.

Lay the needle on a piece of glass, and put the magnet under the glass; it will still attract the needle. The same effects will take place if a board be interposed between the magnet and the iron. This property of the magnet has afforded the means of some very amusing deceptions.

A little figure of a man has been made to spell a person's name. The hand, in which was a piece of iron, rested on a board, under which a person, concealed from view, with a powerful magnet, contrived to carry it from letter to letter, until the word was made up.

The figure of a goose or swan, with a piece of iron concealed about the head, is set to float in water. A rod, with a concealed magnet at the end, is presented to the bird, and it swims after it. The effect is still more amusing, when some food is put on the end of the rod.

The figure of a fish is thrown into the water, with a small magnet concealed in its mouth. Of course, if a baited hook be suspended near it, the magnet and iron, by mutual attraction, will bring the fish to the bait.

Put a piece of iron in one scale of a balance, and an equal

weight in the other scale; bring a magnet under the scale which contains the iron, and it will draw it down. Reverse this experiment, and put the magnet in the scale, and balance it; bring the iron under it, and it will draw down the magnet. Suspend a magnet by a string, and bring a piece of iron near it, and it will attract.

If a magnet suspended by one string, and a piece of iron suspended by another, be brought near one another, they will mutually attract each other, and be drawn to a point between.

Suspend a magnet nicely poised by a thread, and it will point north and south, the same end pointing invariably the same way.

Rub a fine needle with a magnet, and lay it gently on the surface of the water; it will point north and south. Rub various needles with the magnet, and run them through small pieces of cork, and put them to swim in water; they will all point north and south, and the same end will invariably point the same way. This mode of finding the north is sometimes of the utmost service at sea, when the compass is destroyed.

Opposite poles attract; poles of the same name repel. Take two magnets, or two needles rubbed with the magnet, and bring the north and south poles together, and they attract.

Bring the north poles near each other, and they repel. Bring the south poles near each other, and they repel. Rub a needle with a magnet, and run it through a piece of cork, and put it to float in water. Hold a north pole of a magnet near its north pole, and it will keep flying away to avoid it. It may be chased from side to side of a basin. On the other hand, an opposite pole will immediately attract.

Rub four or five needles, and you may lift them up as in a string, the north pole of one needle adhering to the south pole of another.

Put a magnet under a piece of glass, and sprinkle iron-filings on it; they will arrange themselves in a manner that will be very surprising. At each pole will be a vast abundance standing erect, and there will be fewer and fewer as they recede, until there are scarcely any in the middle. If the iron-filings are sprinkled on the magnet itself, they will arrange themselves in a manner very striking.

Lay a needle exactly between the north and south pole, it will move towards neither.

Artificial Coruscations.

There is a method of producing artificial coruscations, or sparkling fiery meteors, which will be visible not only in the

dark but at noon-day, and that from two liquors actually cold. Fifteen grains of solid phosphorus are to be melted in about a drachm of water: when this is cold, pour upon it about two ounces of oil of vitriol; let these be shaken together, and they will at first heat, and afterwards they will throw up fiery balls in great numbers, which will adhere like so many stars to the sides of the glass, and continue burning for a considerable time; after this, if a small quantity of oil of turpentine is poured in, without shaking the phial, the mixture will of itself take fire, and burn very furiously. The vessel should be large, and open at the top. Artificial coruscations may also be produced by means of oil of vitriol and iron, in the following manner:—Take a glass body capable of holding three quarts; put into it three ounces of oil of vitriol and twelve ounces of water; then warming the mixture a little, throw in, at several times, two ounces or more of clean iron-filings; upon this, an ebullition and white vapours will arise; then present a lighted candle to the mouth of the vessel, and the vapour will take fire, and will afford a bright illumination, or flash like lightning. Applying the candle in this manner several times, the effect will always be the same; and sometimes the fire will fill the whole body of the glass, and even circulate to the bottom of the liquor; at others, it will only reach a little way down its neck. The great caution to be used in this experiment is, in making the vapour of a proper heat; for, if too cold, few vapours will arise; and, if made too hot, they will come too fast, and only take fire in the neck of the glass, without any remarkable coruscation.

To make an Egg enter a Phial without breaking.

Let the neck of a phial be ever so strait, an egg will go into it without breaking, if it be first steeped in very strong vinegar, for in process of time the vinegar does so soften it, that the shell will bend and extend lengthways without breaking: and when it is in, cold water thrown upon it will recover its primitive hardness, and, as Cardan says, its primitive figure.

Light produced by Friction, even under Water.

Rub two pieces of fine lump sugar together in the dark; the effect is produced, but in a much greater degree, by two pieces of silex, or quartz: but that which affords the strongest light of any thing, is a white quartz* from the Land's End.

* The white pebbles found on the banks of the Mersey, although not a pure quartz, answer the purpose perfectly well. It is singular, that the friction is invariably accompanied by a strong sulphureous smell.

considerable quantities of which are brought to Bristol, and enter into the composition of china ware. By means of two pieces of such quartz, pretty forcibly rubbed together, you may distinguish the time of the night by a watch: but, what is more surprising, the same effect is produced equally strong by rubbing the pieces of quartz together under water.

Rosin Bubbles.

The following account of a simple and curious experiment is extracted from a letter written by Mr. Morey, of Oxford, New Hampshire, to Dr. Silliman, the editor of the American Journal of Science and Arts.

"If the end of a copper tube, or of a tobacco-pipe stem, be dipped in melted rosin, at a temperature a little above that of boiling water, taken out and held nearly in a vertical position, and blown through, bubbles will be formed of all possible sizes, from that of a hen's egg down to sizes which can hardly be discerned by the naked eye; and from their very lustre, and reflection of the different rays of light, they have a pleasing appearance. Some that have been formed these eight months, are as perfect as when first made. They generally assume the form of a string of beads, many of them perfectly regular, and connected by a very fine fibre; but the production is never twice alike. If expanded by hydrogen gas, they would probably occupy the upper part of the room.

"The formation of these bubbles is ascribed to a common cause, viz. the distention of a viscous fluid by one that is aëriform; and their permanency, to the sudden congelation of the rosin thus imprisoning the air by a thin film of solid matter, and preventing its escape."

A curious Hydraulic Experiment, called the Magical Bottle.

Take a small bottle, (see Plate) AB, Fig. 9, the neck of which must be very narrow, and provide a glass vessel, CD, the height of which exceeds that of the bottle about two inches; fill the bottle, by means of a small funnel, with red wine, and place it in the vessel CD, which is to be previously filled with water. Then, if the bottle be uncorked, the wine will presently come out of it, and rise in form of a small column, to the surface of the water; and at the same time the water entering the bottle, will supply the place of wine; for water being specifically heavier than wine, it will consequently subside to the lowest place, while the other naturally rises to the top.

A similar effect will be produced, if the bottle be filled with water, and the vessel with wine, for the bottle being placed

in the vessel, in an inverted position, the water will descend to the bottom of the vessel, and the wine will rise in the bottle. The same effect may also be produced by any other liquors, the specific gravities of which are considerably different.

Another Hydraulic Experiment, called the Miraculous Vessel.

Take a tin vessel of about six inches in height, and three in diameter, having a mouth of only a quarter of an inch wide, and in the bottom of the vessel make a number of small holes, of a size sufficient to admit a common sewing needle.

Plunge the vessel into water, with its mouth open, and when it is full, cork it, and take it out again; then, as long as the vessel remains corked, no water will come out of it; but as soon as it is uncorked, the water will immediately issue from the small holes at the bottom. It must be observed, however, that if the holes at the bottom of the vessel be more than one-sixth of an inch in diameter, or if they be too numerous, the experiment will not succeed; for, in this case, the pressure of the air against the bottom of the vessel will not be sufficient to confine the water.

A curious Hydraulic Experiment, called Tantalus's Cup.

Take a glass, or any other vessel, (see Plate) ABCD, fig. 10. which has a small bent pipe, EFG, open at each end, running through the middle of it; then, if water or wine be poured into the glass, it will continue in it till the tube is full up to the bend F, which should be a little lower than the upper edge of the glass; but if, after this, you continue to pour more liquor into it, it will endeavour, as usual, to rise higher in the glass, but not finding room for a farther ascent in the tube, it will descend through the part EG, and run out at the end G, as long as you continue to put it in. To those who are unacquainted with the nature of the syphon, the effect may perhaps appear something more extraordinary, if the longest branch of the tube be concealed in the handle of the cup.

This is called the cup of Tantalus, from its resemblance to an experiment of the same kind, by placing an upright image in the cup, and disposing the syphon in such a manner, that, as soon as the water rises to the chin of the image, it will begin to run out through the longest leg, in the same manner as from the cup above-mentioned.

A curious Chemical Experiment, called the Tree of Diana.

Make an amalgam, without heat, of two drachms of leaf silver with one drachm of quicksilver. Dissolve this amalgam

of two ounces, or a sufficient quantity, of pure nitrous acid of a moderate strength: dilute the solution in about a pound and a half of distilled water, agitate the mixture, and preserve it for use in a glass bottle with a ground stopper. When you would make your tree, put into a phial the quantity of an ounce of the above preparation, and add to it about the size of a pea of amalgam of gold or silver, as soft as butter: the vessel must then be left at rest, and soon afterwards small filaments will appear to issue out of the ball of amalgam, which quickly increase, and shoot out branches in the form of shrubs.

A metallic arborisation, somewhat similar, may be produced in the following manner:—Dissolve a little sugar of lead in water, and fill a phial with the solution. Pass a wire through the cork, and affix to the upper part of the wire a small bit of silver, or zinc, in such a manner that it may be immersed in the solution not far from its surface. Set the phial in some place where it may remain undisturbed, and in about twenty-four hours you will perceive the lead beginning to shoot round the wire: this process will continue going on slowly, till you have a beautiful metallic tree. If you have a wide-mouthed phial, or glass jar, the experiment may be pleasingly diversified, by arranging the wire in various forms.

A remarkable Experiment, called Prince Rupert's Drops.

Take up a small quantity of the melted matter of glass with a tube, and let a drop of it fall into a vessel of water. This drop will have a small tail, which, being broken, the whole substance of the drop will burst, with great violence, into a fine powder, and give a little pain to the hand, but do no hurt to it.

It is a remarkable circumstance in this experiment, that the bulb, or body, will bear the stroke of a hammer, without breaking; but when the tail is broken, the above-mentioned effect is produced. If the drop be cooled in the air, the same effect will not take place; and if it be ground away on a stone, nothing extraordinary appears; but if it be put into the receiver of an air-pump, and then broken, the effect will be so violent as to produce light.

How to make Sympathetic Inks of various Kinds.

By sympathetic inks, are meant those kinds of liquors, with which if any characters be written, they will remain invisible, till some method is used to give them a colour.

The first class of these inks consists of such as become visible by passing another liquor over them, or by exposing them to the vapour of that liquor.

The second, of those which do not appear so long as they are kept close, but soon become visible on being exposed to the air.

The third, of such as become apparent by strewing or sifting some very fine powder over them.

The fourth, of those which do not become visible till they are exposed to the fire, or heated.

The fifth, like the fourth, of such as appear by heat, but disappear again when the paper becomes cold, or has had a sufficient time to imbibe the moisture of the air.

Sympathetic Inks of the First Class.—Put some litharge into strong distilled vinegar, and let it stand for twenty-four hours; then strain it off, and, after it is quite settled, put it into a bottle closely corked, and preserve it for use. Having done this, put into a pint bottle two ounces of quicklime, one ounce of orpiment in powder, and as much water as will rise two or three fingers' breadth above them; and when the solution is made, pour the liquid gently off, and let it stand in the sun for two or three days, observing to turn it five or six times each day.

When these liquors are ready for use, any letters written by the first, being exposed to the vapours of the second, will quickly become visible; and if you would have them disappear again, you must draw a sponge, or pencil, dipt in aquafortis, or spirit of nitre, over them: and if, after this, you would have them appear again, stay till the paper is quite dry, and then pass the vivifying liquor, made of the solution of orpiment, over them, as before.

Another Ink of this Class.—Dissolve bismuth in the nitrous acid, and any letters written with this ink will become quite black, by being exposed to the vapour of liver of sulphur, which is of so penetrating a nature, that it will act upon the ink through a quire of paper, or even the slight partition of a room.

A Sympathetic Gold Ink of the Second Class.—Put as much gold into a small quantity of aqua-regia as will dissolve it, and then dilute it with two or three times as much distilled water.

Also dissolve, in a separate vessel, fine pewter in aqua-regia; and when it is well saturated, add to it an equal quantity of distilled water.

Then, if any characters be written with the solution of gold, put them in the shade till they become quite dry, and they will not appear for the first seven or eight hours, but if you dip a pencil, or small fine sponge, in the solution of pewter, and draw it lightly over the invisible characters, they will presently appear of a purple colour.

The purple colour of these letters may be effaced again, by

wetting them with aqua-regia, and may be produced a second time, by passing the solution of pewter over them as before.

A Sympathetic Ink of the Second Class.—Dissolve fine silver in aqua-fortis, and add some distilled water to the solution, in the same manner as in the gold ink; then, whatever is written with this ink, will remain invisible for three or four months, if it be kept close from the air; but if it be exposed to the sun, it will appear in about an hour, of a gray colour, like that of a slate.

Sympathetic Inks of the Third Class,—or such as become visible by having any fine powder strewed over them,—may be composed of the glutinous and colourless juice of any vegetable, the milk of animals, and several other substances.

Sympathetic Inks of the Fourth Class,—are made by diluting acid of vitriol with about three times its weight of common water, or as much as will prevent it from corroding the paper. The juice of lemons, or onions, will answer the same purpose; but either of them requires more heat than the first, and will not keep so long.

A Green Ink of the Fifth Class.—Take zaffre in powder, and let it remain dissolved in aqua-regia for twenty-four hours; after which pour the liquor off clear, and, adding to it as much common water, keep it in a bottle well corked. Then, if any characters be written with this ink, and exposed to the fire, or strong rays of the sun, they will appear of a lively green.

It is the peculiar property of this ink, that as soon as the paper becomes cold again, the letters will disappear; and this alternate appearance and disappearance may be repeated a great number of times, provided the heat be not too great.

Other Sympathetic Inks.

A Yellow Ink of this kind may be made, by steeping the flowers of marigolds seven or eight days in clear distilled vinegar, and then pressing them out, and keeping the liquor well corked in a bottle for use.

For a Red invisible Ink,—take the pure spirit of vitriol, or that of nitre, and add to it eight or ten times as much water, according as you would have it more or less red.

For a Green Ink of this sort,—dissolve salt of tartar, the clearest and driest you can procure, in a sufficient quantity of river water; and *for a Violet sympathetic Ink,* express the juice of lemons, and keep it in a bottle well corked.

Then, if any characters be written with one of these inks, they will appear in their proper colours, the paper having been dipped in the following liquor.

Take a sufficient quantity of the flowers of pansies, or

common violets, and after adding some water to them, strain the liquor through a cloth, and keep it in a bottle for use.

A Sympathetic Ink which appears by being wetted with Water.

Mix alum with a sufficient quantity of lemon juice; then, if any letters or characters be written with this mixture, they will be invisible till they are wetted with water, which will make them appear of a grayish colour, and quite transparent.

Or, you may write with a strong solution of roch-alum only, and when the writing is dry, pour a small quantity of water over it, and it will appear of a white colour, like that of the paper before it was wetted.

Also all saline liquors, such as vitriolic, nitrous, and marine acids, diluted with water, the liquor of fixed vegetable alkalis, and even vinegar, will produce the same effect.

If a little aqua-fortis be mixed with the water, the writing will dry well, and not run out of its form when the paper is wetted.

A curious Recreation with Sympathetic Ink, called the Book of Fate.

Make a book, consisting of seventy or eighty leaves, and in the cover at the end of it, let there be a case which opens next to the back, that it may not be perceived. At the top of each right-hand page, write any question you please; and at the beginning of the book, let there be a table of those questions, with the number of the pages in which each is to be found. Then write with common ink on separate papers, each about half the size of the pages, the same questions that are in the book; and under each of them, write the answer with the ink made with the litharge of lead, or the solution of bismuth.

Soak a double paper in the vivifying ink, made of quicklime and orpiment, or the liver of sulphur; and just before you make the experiment, place it in the case that is in the cover of the book.

Having done this, deliver some of the papers on which the questions are written, to the company; and after they have chosen such as they wish to have answered, let them put them into those leaves where the same questions are contained; then shutting the book for a few minutes, the sulphureous spirit, with which the paper in the cover of the book is impregnated, will penetrate the leaves, and make the answer visible, which will be of a brown colour, and more or less deep, in proportion to the time the book has been closed.

A curious Recreation, called the Transcolored Writing.

Write on a paper, with a violet-coloured liquor, as many letters or words as you please, and ask any person which he will choose to have the writing,—yellow, green, or red. When he has made his choice, have a sponge ready with three sides, which you can easily distinguish, and dip each of its sides in one of the three sympathetic inks; then draw the side of the sponge which corresponds to the colour the person has chosen, over the writing, once only, and it will directly change to the colour required.

An Experiment with Sympathetic Ink, called the Oracular Letters.

Write on several slips of paper different questions, and such as may be answered by the name of some person: for example, Who is the merriest man in company?—*Answer*, Mr. ***. To whom will Miss *** be married?—*Answer*, To Mr. ***. These questions are to be written in the sympathetic ink of the fourth class, and exposed to the fire, and the answers written in the same ink, and left invisible. The papers are then to be folded in the form of letters, and in such a manner, that the part where the name is written shall be directly under the seal; in which case, the heat of the wax will make it visible. Then, if the letter be given to the person who requires the answer, he will find it plainly written.

An Experiment with Sympathetic Ink, called Winter changed to Spring.

Take a print which represents winter, and trace over the trees, plants, and ground, with the green sympathetic ink; observing to make some parts deeper than others, according to their distance. When those parts are dry, paint the other objects in their natural colours; then put the print into a glazed frame, and cover the back of it with a paper, pasted over its border only. When this print is exposed to the heat of a moderate fire, or to the warm rays of the sun, all the grass and foliage will turn to a pleasing green; and if a yellow tint be given to some parts of the print, before the sympathetic ink be drawn over it, the green will be of different shades, and the scene, that a minute before represented Winter, will now be changed into Spring. When this print is placed in the cold, Winter will appear again, and be again driven away by the warm rays of the sun; and this alternate change of seasons may be repeated as often as you please, provided the print be not made too hot.

A remarkable Experiment, called the Revivified Rose.

Take a rose that is quite faded, and throw in some common sulphur in a chafing-dish of hot coal. Hold the rose over the fumes, and it will become quite white; then dip it into a basin of water, and giving it to any one, tell him to put it into his box or drawer, and after locking it, to give you the key. About five or six hours afterwards, return him the key, and when he unlocks his drawer, instead of the white rose he put into it, he will find one perfectly red.

How to Write on Glass by means of the Rays of the Sun.

Dissolve chalk in aqua-fortis, to the consistence of milk, and add to it a strong solution of silver; keep this liquor in a glass decanter, well stopped, and cutting out from a paper the letters you wish to appear, paste it on the decanter, and place it in the sun, in such a manner, that its rays may pass through the spaces cut out of the paper, and fall on the surface of the liquor; then will that part of the glass through which the rays pass be turned black, while that under the paper will remain white; but particular care must be taken that the bottle be not moved during the time of the operation.

To produce different Colours, by pouring a colourless Liquor into a clean Glass.

Take a strong solution of quicksilver, made with spirit of nitre; dilute it with water, and pour it into a hot glass, rinsed in strong spirit of sea-salt, and it will instantly become coloured. Or, if a solution of silver, made with spirit of nitre, considerably diluted, be poured into a glass, prepared in the manner above-mentioned, it will produce the same effect. And if you pour hot water upon new-made *crocus metallorum*, and put it into a clean glass, rinsed with any acid, it will produce an orange colour.

To produce a Colour which appears and disappears by the Influence of the Air.

Put into a decanter some volatile spirit, in which you have dissolved copper filings, and you will have a fine blue tincture; and if the bottle be stopped, the colour will soon return again; and this experiment may be repeated a considerable number of times.

To turn a colourless Liquor Black, by adding a White Powder to it.

Put a hot weak pellucid infusion of galls into a glass, and throw into it a grain of the vitriol of iron, calcined to whiteness, and considerably heated; then, as it falls to the bottom, it will make a black cloud, which will uniformly diffuse itself through the transparent liquor, and gradually turn it black.

The same effect may also be produced by the addition of a little vitriol of iron calcined to a yellow colour, or by the colcothar of vitriol calcined to redness.

The black liquor, produced as above, may be rendered pellucid again, by pouring the liquor hot into a glass rinsed with the pure acid of vitriol. And to make this transparent liquor black again, pour to it as much hot oil of *tartar per deliquium* as will saturate the acid, which has attracted the metallic matter.

Freezing Mixture.

In the time of snow, a freezing mixture may easily be made, by mixing a little snow and common salt in a basin near the fire. If water in an iron cup or phial be put into this mixture, it will immediately be frozen; and if pounded ice and common salt be added, it will have a still more powerful effect.

Experiments with the Microscope.

They who possess this amusing instrument, may easily perform with it a variety of pleasing experiments; among others, the following:—Leave some vinegar exposed in a saucer, for a few days, to the open air; then place a drop of it, by means of a clean pen, or a camel's hair brush, on the transparent object-plate of the microscope; and if the object-plate be properly illuminated from below, you will observe in this drop of liquor animals resembling some small eels, which are in continual motion.

If you slightly bruise some pepper-corns, and infuse them in water for a few days, and then expose a drop of it to the microscope, a number of animals of a different kind will be visible. These are of an oblong shape, and, like the others, in continual motion, going backwards and forwards in all directions, turning aside when they meet each other, or when their passage is stopped by some obstacle.

In other infusions, as in that of new hay, differently shaped animalcules will be found. When the drop in which they swim, and which to them is like a pond, becomes diminished by evaporation, they gradually retire towards the middle,

where they accumulate, and at length perish when entirely deprived of moisture. Previously to this, they appear in great distress, writhe their bodies, and endeavour to escape from that state of uneasiness which they evidently feel.

If the smallest quantity or drop of sulphuric acid be put into a drop of the infusion which swarms with these insects, they immediately throw themselves on their backs, and expire; sometimes losing their skin, which bursts, and suffers small particles of air to escape.

Those who wish to be furnished with microscopic eels, at all seasons, may have them in common paste, such as the bookbinders commonly use. It should neither be too stiff, nor too watery. Expose it to the air, and prevent its hardening or becoming mouldy on the surface, by beating it well together, when it has that tendency. After some days it will become sour; and then, if examined attentively by a microscope, multitudes of exceedingly small, long, and slender animalcules will be visible; these will grow larger, till they are of sufficient size to be seen by the naked eye. A drop or two of vinegar should now and then be poured on the paste; and sometimes, to prevent its being dry, a little vinegar and water. By this means microscopic eels may be had all the year. They must be applied to the microscope upon any flat surface, after having first put on it a very small drop of water for them to swim in. These are very entertaining objects when examined by any kind of microscope, but particularly the solar one, by which the motions of their intestines may very plainly be distinguished; and when the water is nearly dried away, and they are on the point of expiring, their mouths may be seen opening to a considerable width.

If some of the dust of the puff-ball be examined with the microscope, it appears to consist of perfectly round globules, of an orange colour, the diameter of which is only about the one-fiftieth part of the thickness of a hair, so that each of this grain is but the $\frac{1}{125000}$ th part of a globule, equal in diameter to the breadth of a hair.

The farina of flowers is found to be regularly or uniformly organized in each kind of plant. In the mallow, for example, each grain is an opaque ball, covered over with small points. The farina of the tulip, and of most of the liliaceous kind of flowers, bears a striking resemblance to the seeds of the cucumber: that of the poppy is like grains of barley.

There are certain plants, the leaves of which seem to be pierced with a multitude of small holes. Of this kind is the St. John's Wort. If a fragment of this be viewed with a good microscope, the supposed holes are found to be vesicles, contained in the thickness of the leaf, and covered with an exceedingly thin membrane; and these are thought to be the

receptacles which contain the essential and aromatic oil peculiar to the plant. The view exhibited by those plants which have down, such as borage, nettles, &c. is exceedingly curious. When examined by a microscope, they appear to be covered with spikes. Those of borage are, for the most part, bent so as to form an elbow; and though really so close, they appear, by the microscope, to be at a considerable distance from each other. The entire appearance is very similar to that of the skin of a porcupine.

There are two kinds of sand, viz. the calcareous and the vitreous: the former, examined with a microscope, resembles large irregular fragments of rock; but the latter appears like so many rough diamonds. In some instances, the particles of sand seem to be highly polished and brilliant, like an assemblage of diamonds, rubies, and emeralds.

Charcoal is a fine object for the microscope: it is found to be full of pores, regularly arranged, and passing through its whole length.

Those who wish to observe the circulation of the blood, by means of the microscope, may readily obtain the desired satisfaction. An object employed chiefly for this purpose is the delicate transparent membrane which unites the toes of the frog; another object is the tail of the tadpole. If this membrane be extended, and fixed on a piece of glass illuminated below, the motion of the blood in the vessels will be distinctly visible; the appearance resembles a number of small islands, with a rapid current flowing between them.

Take a small tadpole, and, having wrapped its body in a piece of moist cloth, place its tail on the object-plate of the microscope, and enlighten it below, and you will see very distinctly the circulation of the blood; which in some of the vessels proceeds by a kind of undulation, and in others with a uniform motion. The former are thought to be the arteries in which the blood moves, in consequence of the alternate pulsation of the heart; the latter are said to be the veins. The circulation of the blood may be seen also in the legs and tails of shrimps. The transparent legs of small spiders, and those of bugs, will also afford the means of observing the circulation of the blood to very great advantage. The latter are said, by Mr. Baker, to exhibit an extraordinary vibration of the vessels, which he never saw any where else. Very small fish are good objects for this purpose; but the most curious of all spectacles of this kind, is that exhibited by the mesentery of a living frog, applied in particular to the solar microscope.

If you take off a small piece of the epidermis, or scarf skin, of the hand, by means of a sharp razor, and place it on the object-plate of the microscope, you will see it covered with a

multitude of small scales, so exceedingly minute, that, according to Leuwenhoek, a grain of sand would cover two hundred of them. These scales are arranged like those on the back of fishes, like the tiles of a house, each in part covering the other. To ascertain the form of these little scales, scrape the skin with a penknife, and put this dust into a drop of water, and it will be seen that these scales, small as they are, have, in general, five planes, and that each consists of several strata. Underneath these scales are the pores of the epidermis, which, when the former are removed, may be distinctly seen, apparently like small holes, pierced with an exceedingly fine needle. In the length of an inch, twelve hundred have been counted, so that, in a surface equal to a square inch, there are fourteen thousand; and as there are one hundred and forty-four inches in a square foot, the number of pores in a square foot of surface would be more than two millions; and as the surface of the human body is reckoned at fourteen feet, the number of pores in its surface, through which there is a perpetual perspiration going on, must be more than twenty-eight millions.

The hairs of animals, seen through a microscope, appear to be organized bodies: they are composed of long, slender, hollow tubes; some seem to be composed of several small hairs, covered with a common bark; others are hollow throughout. The bristles of a cat's whisker, when cut transversely, exhibit the appearance of a medullary part, which occupies the middle, like the pith in the twig of the elder-tree. A human hair, cut in the same manner, shews a variety of vessels in very regular figures. Hair taken from the head, the eyebrows, the nostrils, the beard, the hand, &c. appear unlike, as well in the roots as in the hairs themselves, and vary as plants do of the same genus, but of different species. Those of the hedgehog contain a kind of real marrow, which is whitish, and formed of radii meeting in a centre. A split hair appears like a stick shivered with beating.

Nothing can be more curious than the appearance exhibited by mouldiness, when viewed through a microscope. If looked at by the naked eye, it seems nothing but an irregular tissue of filaments; but the magnifying-glass shews it to be a forest of small plants, which derive their nourishment from the moist substance which serves them as a base. The stems of these plants may be plainly distinguished, and sometimes the buds, some shut, and some open. They have much similarity to mushrooms, the tops of which, when they come to maturity, emit an exceedingly fine dust, which is their seed.

Upon examining the edge of a very keen razor with a microscope, it will appear as broad as the back of a thick knife, rough, uneven, full of notches and furrows. An exceedingly small needle resembles a rough iron bar. But the sting of a bee,

seen through the same instrument, exhibits every where a polish exceedingly beautiful, without the least flaw, blemish, or inequality, and ends in a point too fine to be discerned.

A small piece of exceedingly fine lawn, appears, through a microscope, like a hurdle or lattice, and the threads themselves seem coarser than the yarn with which ropes are made for anchors. But a silkworm's web appears perfectly smooth and shining, and every where equal.

The smallest dot that can be made with a pen, appears, when viewed by the microscope, an irregular spot, rough, jagged, and uneven. But the little specks on the wings or bodies of insects, are found to be most accurately circular.

A microscope will prove the most boasted performances of art to be ill-shaped, rugged, and uneven. The finest miniature paintings appear before this instrument as mere daubings, plastered on with a trowel, entirely void of beauty, either in the drawing or the colouring. The most even and beautiful varnishes and polishings will be found to be mere roughness, full of gaps and flaws. Thus sink the works of art, before the microscopic eye. But the nearer we examine the works of God, even in the least of his productions, the more sensible shall we be of his wisdom and power. Apply the microscope to any, the most minute of his works, nothing is to be found but beauty and perfection. If we examine the numberless species of insects that swim, creep, or fly around us, what proportion, exactness, uniformity, and symmetry, shall we perceive in all their organs! what a profusion of colouring! azure, green, and vermilion, gold, silver, pearls, rubies, and diamonds; fringe and embroidery on their bodies, wings, heads, and every other part! how high the finishing, how inimitable the polish, we every where behold!

Their wings, all glorious to behold!
Bedeck'd with azure, jet, and gold,
Wide they display: the spangled dew
Reflects their eyes and various hue.

Gay.

The most perfect works of art betray a meanness, a poverty, an inability in the workman; but the works of nature plainly prove, that "the hand which formed them was divine."

Amusing Experiments with the Thermometer.

A thermometer is amusing in a room, to enable us to know with accuracy the real degree of heat, as our own feelings are so very deceptive. According to their state of health at the time, different persons will give a different judgment on the subject. After hot weather, a day which is not very cold, will yet feel so to us, and after cold weather we shall be ready to think a day warm, which is not so severe as the preceding.

In winter, a thermometer in a sitting room enables us to regulate its heat. Too great warmth produced by a fire is injurious to health, as it relaxes the strength, and consumes the pure oxygenous air, so necessary for respiration.

Experiments will shew how differently the feelings of different individuals may be affected by the same degree of heat.

Let one person go out into the cold air in winter for a few minutes, and let another sit by a warm fire; then introduce both into a room without a fire: the person from the cold will feel it warm, and the other will feel it cold.

A much more entertaining experiment will shew, that what will be cold to the one hand, will be warm to the other. Pour warm water into one basin, cold water into a second, and a mixture of hot and cold water into a third; then put the one hand into the cold water, and the other into the warm, for two minutes, and after that put both hands into the lukewarm water, and to the one hand it will feel cold, and to the other hot.

THE BAROMETER.

Rules for judging of and predicting the State of the Weather by the Barometer.

The rising of the mercury presages, in general, fair weather, and its falling, foul weather, as rain, snow, high winds, and storms.

When the surface of the mercury is convex, or stands higher in the middle than at the sides, it is a sign the mercury is then in a rising state; but if the surface be concave, or hollow in the middle, it is then sinking.

In very hot weather, the falling of the mercury indicates thunder.

In winter, the rising presages frost; and in frosty weather, if the mercury falls three or four divisions, there will be a thaw. But in a continued frost, if the mercury rises, it will certainly snow.

When wet weather happens soon after the depression of the mercury, expect but little of it; on the contrary, expect but little fair weather, when it proves fair shortly after the mercury has risen.

In wet weather, when the mercury rises much and high, and so continues for two or three days before the bad weather is entirely over, then a continuance of fair weather may be expected.

In fair weather, when the mercury falls much and low, and thus continues for two or three days before the rain comes, then a deal of wet may be expected, and probably high winds.

The unsettled motion of the mercury denotes unsettled weather.

The words engraved on the scale are not so much to be attended to, as the rising and falling of the mercury; for if it stands at much rain, and then rises to changeable, it denotes fair weather, though not to continue so long as if the mercury had risen higher.

If the mercury stands at fair, and falls to changeable, bad weather may be expected.

In winter, spring, and autumn, the sudden falling of the mercury, and that for a large space, denotes high winds and storms; but in summer it presages heavy showers, and often thunder. It always sinks very low for great winds, though not accompanied with rain; but it falls more for wind and rain together, than for either of them alone.

If, after rain, the wind change into any part of the north, with a clear and dry sky, and the mercury rise, it is a certain sign of fair weather.

After very great storms of wind, when the mercury has been low, it commonly rises again very fast.

In settled fair weather, except the mercury sink much, expect but little rain.

In a wet season, the smallest depression must be attended to; for when the air is much inclined to showers, a little sinking in the barometer denotes more rain. And in such a season, if it rise suddenly fast and high, fair weather cannot be expected to last more than a day or two.

The greatest heights of the mercury are found upon easterly and north-easterly winds; and it may often rain or snow, the wind being in these points, while the barometer is in a rising state, the effects of the wind counteracting its influence. But the mercury sinks for wind as well as rain in all other points of the compass.

New Method of Preserving Birds.—(From the Annual Register.)

When I receive a bird fresh taken, (says the author,) I open the venter, from the lower part of the breast-bone down to the anus, with a pair of scissars, and extract all the contents. This cavity I immediately fill up with the following mixture, and then bring the wound together by a suture, so as to prevent the stuffing from coming out. The gullet or passage I fill, from the beak down to where the stomach lies, with the mixture finer ground, which must be forced down a little at a time, by the help of a quill or wire: the head I open near the root of the tongue, with the scissars, and, after having turned out the brains, I fill the cavity with the same mixture.

The bird being thus filled, must now be hung up by the legs to dry for two days, to let the spice settle; after which it may be placed in a frame to dry, in the same attitude as we usually see it when alive. In this frame it must be held up by two threads, the one passing from the anus to the lower part of the back, and the other through the eyes: the ends of these threads are to brace the bird up to its proper attitude, fasten them to the side of the frame, and place it on a chip pill-box. It will now require no other support than a pin through each foot, fastened into the box: it must remain a month or two to dry. The eyes must be supplied by proportional glass beads, fixed in with strong gum-water.

The mixture is: common salt, one pound; alum, powdered, four ounces; ground pepper, two ounces; all blended together.

To take the Impression of the Wings of a Butterfly in all their Colours.

Kill it without spoiling; cut off the body close to the wings, which contrive to spread in a flying position; then take a piece of white paper, wash part of it with thick gum-water; when dry, lay it on a smooth board, with the wings on the gum-water; lay another paper over this, press both very hard, let them remain under pressure for an hour; afterwards take off the wings of the butterfly, and you will find a perfect impression of them, with all their various colours, remaining on the paper. Draw, between the wings of the impression, the body of the butterfly, and colour it after life.

To take the Impression of a Leaf of any Tree, Plant, or Shrub, with all its Veins.

Having put the intended leaf into a book for a few minutes, which will cause it to lie very flat, you must have a pair of balls, somewhat of the shape of those used by printers; have them covered with kid-skin, that being the best leather for the purpose. These balls may be made to any size. You must then procure some lamp-black, ground or mixed with drying oil, and having put a small quantity on one of the balls, spread it all over with the other till they are both black; then laying the leaf on one of them, place the other over it, and press both very hard together. When the leaf is sufficiently black, take it off the ball, and place it between a sheet of white paper. Press it gently with your hand, the heat and pressure of which will cause it to receive an accurate delineation of all its veins.

Instead of black, any other colour may be used. Verdigris makes a pleasant green; and by adding yellow ochre, or Prussian blue, you may approach the original tint of the leaf, and your impression will almost equal that of nature.

Curious Experiments respecting Colours.

The following curious and useful remarks on the different degrees of heat imbibed from the sun's rays, &c. by cloths of different colours, were extracted from "Experiments and Observations," by that famous American philosopher and politician, Dr. B. Franklin.

"First, let me mention an experiment you may easily make yourself. Walk but a quarter of an hour in your garden when the sun shines, with a part of your dress white, and a part black; then apply your hand to them alternately, and you will find a very great difference in their warmth. The black will be quite hot to the touch, the white still cool.

"Another. Try to fire paper with a burning-glass. If it be white, you will not easily burn it; but if you bring the focus to a black spot, or upon letters written or printed, the paper will immediately be on fire under the letters.

"Thus fullers and dyers find that black cloths, of equal thickness with white ones, and hung out equally wet, dry in the sun much sooner than the white, being more readily heated by the sun's rays. It is the same before a fire; the heat of which sooner penetrates black stockings than white ones, and is apt sooner to burn a man's shins. Also beer much sooner warms in a black mug set before the fire, than in a white one, or in a bright silver tankard.

"My experiment was this: I took a number of little square pieces of broad cloth from a tailor's pattern-card, of various colours. There was black, deep blue, lighter blue, green, purple, red, yellow, white, and other colours, or shades of colours. I laid them all out upon the snow in a bright sunshiny morning. In a few hours, (I cannot now be exact as to the time,) the black being warmed most by the sun, was sunk so low as to be below the stroke of the sun's rays; the dark blue almost as low, the lighter blue not quite so low as the dark, the other colours less as they were lighter; and the quite white remained on the surface of the snow, not having entered it at all.

"What signifies philosophy that does not apply to some use? May we not learn from hence, that black cloths are not so fit to wear in a hot sunny climate, or season, as white ones; because, in such clothes the body is more heated by the sun when we walk abroad, and are at the same time heated by the exercise, which double heat is apt to bring on putrid dangerous fevers?—that soldiers and seamen, who must march

and labour in the sun, should, in the East or West Indies, have a uniform of white?—that summer hats for men or women, should be white, as repelling that heat which gives head-achs to many, and to some the fatal stroke that the French call the *coup de soleil*?—that the ladies' summer hats, however, should be lined with black, as not reverberating on their faces those rays which are reflected upwards from the earth or water?—that the putting a white cap of paper or linen, within the crown of a black hat, as some do, will not keep out the heat, though it would if placed without?—that fruit-walls being blackened, may receive so much heat from the sun in the day-time, as to continue warm, in some degree, through the night, and thereby preserve the fruit from frosts, or forward its growth?—with sundry other particulars, of less or greater importance, that will occur from time to time to attentive minds?"

Thirty Soldiers having deserted, so to place them in a Ring, that you may save any Fifteen you please, and it shall seem the Effect of Chance.

This recreation is usually proposed thus: Fifteen Christians and fifteen Turks being in a ship at sea, in a violent tempest, it was deemed necessary to throw half the number of persons overboard, in order to disburden the ship, and save the rest; to effect this, it was agreed to be done by lot, in such a manner, that the persons being placed in a ring, every ninth man should be cast into the sea, till one half of them were thrown overboard. Now, the pilot, being a Christian, was desirous of saving those of his own persuasion: how ought he therefore to dispose the crew, so that the lot might always fall upon the Turks?

This question may be resolved by placing the men according to the numbers annexed to the vowels in the words of the following verse:—

Po-pu-le-am Jir-gam Ma-ter Re-gi-na fe-re-bat.
 4 5 2 1 3 1 1 2 2 3 1 2 2 1

from which it appears, that you must place four of those you would save first; then five of those you would punish. After this, two of those to be saved, and one to be punished; and so on. When this is done, you must enter the ring, and beginning with the first of the four men you intend to save, count on to nine; and turn this man out to be punished; then count on, in like manner, to the next ninth man, and turn him out to be punished; and so on for the rest.

It is reported that Josephus, the author of the Jewish History, escaped the danger of death by means of this problem;

for being governor of Joppa, at the time that it was taken by Vespasian, he was obliged to secrete himself with thirty or forty of his soldiers in a cave, where they made a firm resolution to perish by famine rather than fall into the hands of the conqueror; but being at length driven to great distress, they would have destroyed each other for sustenance, had not Josephus persuaded them to die by lot, which he so ordered, that all of them were killed except himself and another, whom he might easily destroy, or persuade to yield to the Romans.

Three Persons having each chosen, privately, one out of three Things,—to tell them which they have chosen.

Let the three things, for instance, be a ring, a guinea, and a shilling, and let them be known privately to yourself by the vowels *a, e, i*, of which the first, *a*, signifies one, the second, *e*, two, and the third, *i*, three.

Then take 24 counters, and give the first person 1, which signifies *a*, the second 2, which represents *e*, and the third 3, which stands for *i*: then, leaving the other counters upon the table, retire into another room, and bid him who has the ring take as many counters from the table as you gave him; he that has the guinea, twice as many, and he that has the shilling four times as many.

This being done, consider to whom you gave one counter, to whom two, and to whom three; and as there were only twenty-four counters at first, there must necessarily remain either 1, 2, 3, 5, 6, or 7, on the table, or otherwise they must have failed in observing the directions you gave them.

But if either of these numbers remain, as they ought, the question may be resolved by retaining in your memory the six following words:—

<i>Salve</i>	<i>certa</i>	<i>anima</i>	<i>semita</i>	<i>vita</i>	<i>quies.</i>
1	2	3	5	6	7

As, for instance, suppose the number that remained was 5 then the word belonging to it is *semita*; and as the vowels in the first two syllables of this word are *e* and *i*, it shews, according to the former directions, that he to whom you gave two counters has the ring; he to whom you gave three counters, the gold; and the other person, of course, the silver, it being the second vowel which represents 2, and the third which represents 3.

How to part an Eight Gallon Bottle of Wine equally between two Persons, using only two other Bottles, one of Five Gallons, and the other of Three.

This question is usually proposed in the following manner:

A certain person having an eight-gallon bottle filled with excellent wine, is desirous of making a present of half of it to one of his friends; but as he has nothing to measure it out with, but two other bottles, one of which contains five gallons, and the other three, it is required to find how this may be accomplished?

In order to answer the question, let the eight-gallon bottle be called A, the five-gallon bottle B, and the three-gallon bottle C; then, if the liquor be poured out of one bottle into another, according to the manner denoted in either of the two following examples, the proposed conditions will be answered.

	8	5	3	8	5	3
	A	B	C	A	B	C
	8	0	0	8	0	0
	3	5	0	5	0	3
	3	2	3	5	3	0
	6	2	0	2	3	3
	6	0	2	2	5	1
	1	5	2	7	0	1
	1	4	3	7	1	0
	4	4	0	4	1	3

A Quantity of Eggs being broken, to find how many there were without remembering the Number.

An old woman, carrying eggs to market in a basket, met an unruly fellow, who broke them. Being taken before a magistrate, he was ordered to pay for them, provided the woman could tell how many she had; but she could only remember, that in counting them into the basket by twos, by threes, by fours, by fives, and by sixes, there always remained one; but in counting them in by sevens, there were none remaining. Now, in this case, how was the number to be ascertained?

This is the same thing as to find a number, which being divided by 2, 3, 4, 5, and 6, there shall remain 1, but being divided by 7 there shall remain nothing; and the least number, which will answer the conditions of the question, is found to be 301, which was therefore the number of eggs the old woman had in her basket.

To find the least Number of Weights, that will weigh from One Pound to Forty.

This problem may be resolved by the means of the geometrical progression, 1, 3, 9, 27, 81, &c. the property of which is such, that the last sum is twice the number of all the rest,

and one more; so that the number of pounds being forty, which is also the sum of 1, 3, 9, 27, these four weights will answer the purpose required. Suppose it was required, for example, to weigh eleven pounds by them: you must put into one scale the one-pound weight, and into the other the three and nine-pound weights, which, in this case, will weigh only eleven pounds, in consequence of the one-pound weight being in the other scale; and therefore, if you put any substance into the first scale, along with the one-pound weight, and it stands in equilibrio with the three and nine in the other scale, you may conclude it weighs eleven pounds.

In like manner, to find a fourteen-pound weight, put into one of the scales the one, three, and nine-pound weights, and into the other that of twenty-seven pounds, and it will evidently outweigh the other three by fourteen pounds; and so on for any other weight.

To break a Stick which rests upon two Wine Glasses, without injuring the Glasses.

Take a stick, (see Plate,) AB. fig. 1, of about the size of a common broomstick, and lay its two ends, AB, which ought to be pointed, upon the edges of two glasses placed upon two tables of equal height, so that it may rest lightly on the edge of each glass. Then take a kitchen poker, or a large stick, and give the other a smart blow, near the middle point *c*, and the stick AB will be broken, without in the least injuring the glasses: and even if the glasses be filled with wine, not a drop of it will be spilt, if the operation be properly performed. But on the contrary, if the stick were struck on the under-side, so as to drive it up into the air, the glasses would be infallibly broken.

A Number of Metals being mixed together in one Mass, to find the Quantity of each of them.

Vitruvius, in his Architecture, reports, that Hiero, king of Sicily, having employed an artist to make a crown of pure gold, which was designed to be dedicated to the gods, suspected that the goldsmith had stolen part of the gold, and substituted silver in its place: being desirous of discovering the cheat, he proposed the question to Archimedes, desiring to know if he could, by his art, discover whether any other metal were mixed with the gold. This celebrated mathematician being soon afterwards bathing himself, observed, that as he entered the bath, the water ascended, and flowed out of it; and as he came out of it, the water descended in like manner: from which he inferred that if a mass of pure gold,

silver, or any other metal, were thrown into a vessel of water, the water would ascend in proportion to the bulk of the metal. Being intensely occupied with the invention, he leaped out of the bath, and ran naked through the streets, crying, "I have found it, I have found it!"

The way in which he applied this circumstance to the solution of the question proposed was this: he procured two masses, the one of pure gold, and the other of pure silver, each equal in weight to the crown, and consequently of unequal magnitudes; then immersing the three bodies separately in a vessel of water, and collecting the quantity of water expelled by each, he was presently enabled to detect the fraud, it being obvious, that if the crown expelled more water than the mass of gold, it must be mixed with silver or some baser metal. Suppose, for instance, in order to apply it to the question, that each of the three masses weighed eighteen pounds; and that the mass of gold displaced one pound of water, that of silver a pound and a half, and the crown one pound and a quarter only: then, since the mass of silver displaced half a pound of water more than the same weight of gold, and the crown a quarter of a pound more than the gold, it appears, from the rule of proportion, that half a pound is to eighteen pounds, as a quarter is to nine pounds; which was, therefore, the quantity of silver mixed in the crown.

Since the time of Archimedes, several other methods have been devised for solving this problem; but the most natural and easy is, that of weighing the crown both in air and water, and observing the difference.

To make a mutual Exchange of the Liquor in two Bottles, without using any other Vessel.

Take two bottles, which are as nearly equal as possible, both in neck and belly, and let one be filled with oil, and the other with water; then clap the one that is full of water dexterously upon the other, so that the two necks shall exactly fit each other; and as the water is heavier than the oil, it will naturally descend into the lower bottle, and make the oil ascend into its place. In order to invert the bottle of water without spilling the contents, place a bit of thin writing paper over the mouth of the bottle; and when you have placed the bottle in the proper position, draw out the paper quickly and steadily.

How to make a Peg that will exactly fit Three different Holes.

Let one of the holes be circular, the other square, and the third an oval; then it is evident, that any cylindrical body,

of a proper size, may be made to pass through the first hole perpendicularly; and if its length be just equal to its diameter, it may be passed horizontally through the second, or square hole; also, if the breadth of the oval be made equal to the diameter of the base of the cylinder, and its longest diameter equal to the diagonal of it, the cylinder, being put in obliquely, will fill it as exactly as any of the former.

To place Three Sticks, or Tobacco Pipes, upon a Table, in such a manner that they may appear to be unsupported by any thing but themselves.

Take one of the sticks, or pipes, (see Plate,) AB, fig. 2, and place it in an oblique position, with one of its ends, B, resting on the table; then put one of the other sticks, as CD, across this in such a manner that one end of it, D, may be raised, and the other touch the table at C. Having done this, take the third stick E, and complete the triangle with it, making one of its ends E rest on the table, and running it under the second, CD, in such a manner that it may rest upon the first, AB; then will the three sticks, thus placed, mutually support each other; and even if a small weight be laid upon them, it will not make them fall, but strengthen, and keep them firmer in their position.

How to prevent a heavy Body from falling, by adding another heavier Body to it on that side towards which it inclines.

On the edge of a shelf, or table, or any other horizontal surface, lay a key, (see Plate,) CD, fig. 3, in such a manner, that, being left to itself, it would fall to the ground; then, in order to prevent this, take a crooked stick DFG, with a weight, H, at the end of it; and having inserted one end of the stick in the open part of the key, at D, let it be so placed, that the weight H may fall perpendicularly under the edge of the table, and the body by these means will be effectually prevented from falling.

The same thing may be done by hanging a weight at the end of a tobacco-pipe, a stick, or any other body; the best means of accomplishing which will be easily known by a few trials.

To make a false Balance, that shall appear perfectly just when empty, or when loaded with unequal Weights.

Take a balance, (see Plate,) DCE, fig. 4, the scales and arms of which are of such unequal weights and lengths, that the scale A may be in proportion to the scale B, as the length

of the arm CE is to the length of the arm CD; then will the two scales be exactly in equilibrio about the point C; and the same will be the case, if the two arms CD, CE, are of equal length, but of unequal thickness, provided the thickness of CD is to that of CE, as the weight of the scale B is to that of A.

For example; suppose the arm CD is equal to three ounces, and the arm CE to two, and that the scale B weighs three ounces, and the scale A two; then the balance, in this case, will be exactly true when empty; and if a weight of two pounds be put into the scale A, and one of three pounds into B, they will still continue in equilibrio. But the fallacy in this, and all other cases of the same kind, may be easily detected, in shifting the weights from one scale to the other.

How to lift up a Bottle with a Straw, or any other slight Substance.

Take a straw, (see Plate,) AB, fig. 5, which is not broken or bruised, and bend one end of it into a sharp angle ABC; then if this end of the straw be put into the bottle, so that the bent part of it may rest against either of its sides, you may take the other end in your hand, and lift up the bottle by it without breaking the straw; and this will be the more easily done, according as the angular part of the straw approaches nearer to that which comes out of the bottle.

How to make a Cone, or Pyramid, move upon a Table without Springs, or any other artificial Means.

Take a cone, or pyramid, of paper, or any other light substance, and put a beetle, or some such small insect, privately under it; then, as the animal will naturally endeavour to free itself from its captivity, it will move the cone towards the edge of the table, and as soon as it comes there, will immediately return for fear of falling; and by moving backwards and forwards in this manner, will occasion much diversion to those who are ignorant of the cause.

To make a Pen, which holds One Hundred Sheep, hold double the Number, by only adding two Hurdles more.

In the first pen, or that which holds one hundred sheep, the hurdles must be so disposed, that there shall be only one at the top and bottom, and the rest in equal numbers on each side; then it is obvious, that if one hurdle more be placed at each end, the space enclosed must necessarily be double the former and consequently will hold twice the number of sheep.

An ingenious Recreation, called the Two Communicative Busts.

Take two heads of plaster of Paris, and place them on pedestals on the opposite sides of a room. Then take a tin tube, of an inch in diameter, and let it pass from the ear of one head through the pedestal, and under the floor, to the mouth of the other, observing, that the end of the tube which is next the ear of one head, should be considerably larger than that which comes to the mouth of the other.

The whole being so disposed that there may be no suspicion of a communication, let any person speak with a low voice into the ear of one bust, and the sound will be distinctly heard by any one who shall place his ear to the mouth of the other; and if there be two tubes, one going to the ear, and the other to the mouth of each head, two persons may converse together, by applying their mouth and ear reciprocally to the mouth and ear of the busts, without being heard by any other persons in the room.

Another Recreation of the same kind, called the Oracular Head.

Place a bust on a pedestal in the corner of a room, and let there be two tubes, one of which goes from the mouth, and the other from the ear of the bust, through the pedestal and floor, to an under apartment.

Then if a person be placed in the under room, by applying his ear to one of the tubes as soon as a proper signal is given, he will hear any question that is asked, and can immediately return an answer; and if wires be contrived to go from the under jaw and eyes of the bust, they may be made to move at the same time, and by these means appear to deliver the answer.

It was by a contrivance of this kind, that Don Antonio de Moreno so much astonished the celebrated Knight of the Woe-ful Countenance, and his facetious squire Sancho Panza, by resolving certain doubts proposed by the former concerning his adventures in the cave of Montesinos, and the disenchantment of my lady Dulcinea.

How to make a Piece of Metal, or any other heavy Body, swim upon the Surface of Water, like a Cork

The specific gravity of water is inferior to that of metals, and consequently water, absolutely speaking, cannot support a ball of iron or lead; but if this ball be flattened, and beat out to a very thin plate, it will, if put softly upon still water, be prevented from sinking, and will swim upon its surface like any light substance. In like manner, if a fine steel needle,

which is perfectly dry, be placed gently upon some still water in a vessel, it will float upon the surface without sinking.

But if you would have a metallic body of large dimensions to swim upon water, you must reduce it into a thin concave plate, like a kettle; in which case, as the air it contains, together with the body itself, weighs less than the same bulk of water, it cannot possibly sink; as is evident from large copper boats, or pontoons, by which whole armies have frequently passed over rivers without danger.

If this concave metallic vessel be placed upon the water with its mouth downwards, it will swim as before, and the contained air will keep the bottom of it from being wet; for that the water will not rise into any hollow vessel which is immersed into it, may be made evident thus:—Take a glass tumbler, and plunge it into water with its mouth downwards, and you will find, when you take it out, that the inside of the vessel is perfectly dry, so that if a live coal were put there, it would not be extinguished.

A curious Experiment, to prove that Two and Two do not make Four.

Take a glass vessel with a long narrow neck, which, being filled with water, will hold exactly a quart; then put into this vessel a pint of water, and a pint of acid of vitriol, and you will presently perceive, that the mixture will not fill the vessel, as it did when a quart of water only was put into it. The acid of vitriol must be put in gradually, by little and little at a time, mixing each portion with the water before you add more, by shaking the bottle, and leaving its mouth open, otherwise the bottle will burst. The mixture in this case also possesses a considerable degree of heat, though the two ingredients of themselves are perfectly cold; and this phenomenon is not to be accounted for, by supposing that the acid of vitriol is received into the pores of the water, for then a small portion of it might be absorbed by the water, without augmenting its bulk, which is known not to be the case; but the very form of the bodies in this experiment is changed, there being, as Dr. Hooke, who first noticed the fact, observes, an actual penetration of dimensions. Chemistry also furnishes a number of other instances, which shew that two bodies, when mixed together, possess less space than when they are separate.

An ingenious Method of Secret Writing, by means of corresponding Spaces.

Take two pieces of pasteboard, or stiff paper, out of which cut a number of oblong figures, at different distances from

each other, as in the following example. Keep one of these pieces for yourself, and give one to your correspondent; and when you are desirous of sending him any secret intelligence, lay the pasteboard upon a sheet of paper of the same size, and in the spaces which are cut out, write what you would have him only to understand, and fill up the intermediate parts of the paper with something which makes with these words a different sense. Then, when your correspondent receives this letter, by applying it to his pasteboard, he will be able to comprehend your meaning.

EXAMPLE.

I shall be much obliged to you, as reading alone engages my attention at present, if you will send me any of the eight volumes of the Spectator; I hope you will excuse this freedom, but for a winter's evening I don't know a better entertainment. If I fail to return it soon, never trust me for the time to come.

A curious Experiment, which depends on an Optical Illusion.

On the bottom of the vessel, (see Plate,) AIBD, fig. 6, place three pieces of money, as a half-crown, a shilling, and a sixpence; the first at E, the second at F, and the third at G. Then let a person be placed with his eye at H, so that he can see no farther into the vessel than I; and tell him, that by pouring water into the vessel, you will make him see three different pieces of money, which he may observe are not poured in with the water.

For this purpose, desire him to keep himself steady in the same position, and, pouring the water in gently, that the pieces of money may not be moved out of their places, when it comes up to K, the piece G will become visible to him; when it comes up to L, he will see the two pieces G and F; and when it rises to M, all the three pieces will become visible: the cause of which is owing to the refraction of the rays of light, in their passage through the water; for while the vessel is empty, the ray HI will proceed in a straight line; but in proportion as it is filled with water, the ray will be bent into the several directions NG, OF, PE, and by these means the pieces are rendered visible.

A curious Experiment, of nearly the same kind as the last, called Optical Augmentation.

Take a large drinking-glass, of a conical figure, and having put a shilling into it, fill the glass about half full with water.

then place a plate on the top of it, and turn it quickly over, so that the water may not get out. This being done, look through the glass, and you will now perceive a piece of money of the size of half-a-crown; and somewhat higher up, another piece of the size of a shilling. But if the glass be entirely filled with water, the large piece at the bottom only will be visible.

This phenomenon is occasioned by your seeing the piece through the conical surface of the water, at the side of the glass, and through the flat surface at the top of the water, at the same time; for the conical surface dilates the rays, and makes the piece appear larger, while the flat surface only refracts them, and occasions the piece to be seen higher up in the glass, but still of its natural size.

Another curious Experiment, called Optical Subtraction.

Against the wainscot of a room fix three small pieces of paper, as A, B, C, fig. 7, (see Plate,) about a foot and a half or two feet asunder, at the height of your eye; and placing yourself directly before them, about five times the distance from them that the papers are from each other, shut one of your eyes, and look at them with the other, and you will then see only two of those papers, suppose A and B; but altering the position of your eye, you will now see the third, and one of the first, suppose A; and by altering its position a second time, you will see B and C, but in neither case all three of them together.

The cause of this phenomenon is, that one of the three pencils of rays, which come from these objects, falls on the optic nerve at D, whereas, to produce distinct vision, it is necessary that the rays of light fall on some part of the retina E, F, G, H.

From this experiment, the use of having two eyes may be easily perceived; for he that has only one can never see three objects placed in this position; or all the parts of one object, of the same extent, without altering the situation of his eye.

An Optical Experiment, shewing how to produce an Artificial Rainbow.

In any room which has a window facing the sun, suspend a glass globe, filled with water, by a string which runs over a pulley, so that the sun's rays may fall directly upon it; then drawing the globe gradually up, when it comes to the height of about forty degrees above the horizon, you will see, by placing yourself in a proper situation, the glass tinged with a purple colour; and by drawing it gradually higher up, the

other prismatic colours, blue, green, yellow, and red, will successively appear; but after this they will all vanish, till the globe is raised to about fifty degrees, when they will again be seen, but in an inverted order, the red appearing first, and the blue, or violet, last; and when the globe comes up to little more than fifty-four degrees, they will entirely vanish.

These appearances serve to illustrate the phenomena of natural rainbows, of which there are generally two, the one being about eight degrees above the other, and the order of their colours inverted, as in this experiment; the red being the uppermost colour in the lower bow, and the violet in the other.

An artificial Rainbow may also be produced as follows.

Take some water in your mouth, and turn your back to the sun; then if it be blown forcibly out against some dark or shady place, you will see the drops formed by the beams of the sun into an apparent rainbow, which, however, soon vanishes.

A curious Optical Illusion, produced by means of a Concave Mirror.

Take a glass bottle, (see Plate,) ABC, fig. 8, and fill it with water to the point B; leave the upper part, BC, empty, and cork it in the common manner; place this bottle opposite a concave mirror, and beyond its focus, so that it may appear reversed; then if you place yourself still farther from the mirror, the bottle will appear to you in the situation *a b c*.

And in this apparent bottle it is remarkable, that the water, which, according to the laws of catoptrics, and all other experiments of this kind, should appear at *a b*, appears, on the contrary, at *b c*, the part *a b* seeming to be entirely empty.

And if the bottle be inverted, and placed before the mirror, as in the under part of the figure, its image will appear in its natural erect position, but the water, which is in reality at *b c*, will appear at *a b*.

And if, while the bottle is inverted, it be uncorked, and the water suffered to run gently out, it will appear, that while the part BC is emptying, the part *a b* in the image is filling; and if, when the bottle is partly empty, some drops of water fall from the bottom A, towards BC, it seems in the image as if there were formed at the bottom of the part *a b* bubbles of air arising from *a* to *b*, which is the part that seems full.

The circumstances most remarkable in this experiment, are, first, not only to see an object where it is not, but also where its image is not; and, secondly, that of two objects, which

are really in the same place, as the surface of the bottle and the water it contains, the one should be seen at one place, and the other at another; and also that the bottle should be seen in the place of its image, and the water where neither it nor its images are.

It is, however, to be noted, that if any coloured liquor be put into the bottle instead of water, no such illusion will take place.

There is one phenomenon more of this kind, which ought not to be omitted; for though it be common enough, it is also extremely pleasing, and easy to be performed.

If you place yourself before a concave mirror, at a proper distance, your figure will appear inverted; and if you stretch out your hand towards the mirror, you will perceive another hand, which seems to meet and join it, though imperceptible to the touch.

And if, instead of your hand, you make use of a drawn sword, and present it in such a manner that its point may be directed towards the focus of the rays reflected by the mirror, another sword will appear, and seem to encounter that in your hand. But it is to be observed, that to make this experiment succeed well, you must have a mirror of at least a foot in diameter, that you may see yourself in part; and if you have a mirror large enough to see your whole person, the illusion will be still more striking.

How to make a violent Tempest, by means of artificial Rain and Hail.

Make a hollow cylinder of wood, very thin at the sides, about eight or ten inches long, and two or three feet in diameter. Divide its inside into five equal partitions, by means of boards of about six inches wide; and let there be a space between them and the wooden circle, of about one-sixth of an inch; observing, that the boards are to be placed obliquely to each other.

This being done, put into the cylinder four or five pounds of leaden shot, of a size that will easily pass through the opening left for this purpose; then turn the cylinder on its axis, and the sound of the machine, when in motion, will represent that of rain, which will increase with the velocity of the motion; and if a larger sort of shot be used, it will produce the sound of hail.

Magic Square.

This, in arithmetic, is a square figure made up of numbers in arithmetical proportion, so disposed in parallel and equal

ranks, that the sums of each row, taken either perpendicularly, horizontally, or diagonally, are equal: thus—

Natural Square.

1	2	3
4	5	6
7	8	9

Magic Square.

2	7	6
9	5	1
4	3	8

Magic squares seem to have been so called, from their being used in the construction of talismans.

Take another instance:—

Natural Square.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Magic Square.

16	14	8	2	25
3	22	20	11	9
15	6	4	23	17
24	18	12	10	1
7	5	21	19	13

where every row and diagonal in the magic square, makes just the sum 65, being the same as the two diagonals of the natural square.

It is probable that these magic squares were so called, both because of this property in them, viz. that the ranks in every direction make the same sum, which appeared extremely surprising, especially in the more ignorant ages, when mathematics passed for magic; and because also of the superstitious operations they were employed in, as, the construction of talismans, &c.; for, according to the childish philosophy of those days, which ascribed virtues to numbers, what might not be expected from numbers so seemingly wonderful? The magic square was held in great veneration among the Egyptians, and the Pythagoreans their disciples, who, to add more efficacy and virtue to this square, dedicated it to the then known seven planets, divers ways, and engraved it upon a plate of the metal that was esteemed in sympathy with the planet. The square, thus dedicated, was enclosed by a regular polygon, inscribed into a circle, which was divided into as many equal parts as there were units in the side of the square; with the names of the angels of the planet, and the signs of the zodiac written upon the void spaces between the polygon and the circumference of the circumscribed circle. Such a talisman,

or metal, they vainly imagined would, upon occasion, befriend the person who carried it about him. To Saturn, they attributed the square of 9 places, or cells, the side being 3, and the sum of the number in every row 15: to Jupiter, the square of 16 places, the side being 4, and the amount of each row 34: to Mars, the square of 25 places, the side being 5, and the amount of each row 65: to the Sun, the square with 36 places, the side being 6, and the sum of each row 111: to Venus, the square of 49 places, the side being 7, and the amount of each row 175: to Mercury, the square with 64 places, the side being 8, and the sum of each row 260: and to the Moon, the square of 81 places, the side being 9, and the amount of each row 369. Finally, they attributed to imperfect matter, the square with 4 divisions, having 2 for its side: and to God, the square of only one cell, the side of which is also an unit, which, multiplied by itself, undergoes no change.

MORAL AND PHYSICAL
THERMOMETER;
 OR, A
 SCALE OF THE PROGRESS
 OF
TEMPERANCE AND INTEMPERANCE.

LIQUORS, with their EFFECTS in their usual Order.

TEMPERANCE.

70	Water.....	Health, Wealth.
60	Milk and Water	Serenity and Composure of Mind.
50	Small Beer.....	Reputation, Long Life, and Happiness.
40	Cider and Perry	Cheerfulness and Contentment.
30	Wine	Strength, Vigour, and Nourishment,—
20	Porter.....	when taken only at Meals, and in
10	Strong Beer	moderate quantities.

INTEMPERANCE.

		<u>Vices.</u>	<u>Diseases.</u>	<u>Punishments</u>
10	Punch	Idleness;	Sickness;	Debt;
20	Toddy & Crank,	Peevishness;	Puking; and	Black Eyes;
30	{ Grog, & Bran-	Quarrelling;	Tremors of the	Rags;
	{ dy and Water,	Fighting;	Hands in the	Hunger;
40	Flip and Shrub,	Lying;	Morning;	Hospital,
	{ Bitters infused	Swearing;	Bloatedness;	Poor-house
50	{ in Spirits,	Obscenity;	Inflamed Eyes;	Jail,
	{ Usquebaugh,	Swindling;	Red Nose and	Whipping;
	{ Hysterio		Face;	
	{ Water.		Sore & swelled	
60	{ Gin, Aniseed,	Perjury;	Legs;	
	{ Brandy, Rum,	Burglary;	Jaundice;	
70	{ and Whiskey,		Pains in the	
	{ in the Morning		Limbs and	
	{ Ditto, during	Murder;	Burning in the	
	{ the Day and	Suicide.	Palms of the	
	{ Night.		Hands & Soles	
			of the Feet;	
			Dropsy;	
			Epilepsy;	
			Melancholy;	
			Madness;	
			Palsy;	
			Apoplexy;	
			Death.	

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